



■ Made  
■ in  
■ Germany



**FRANKEN**  
**TOP-Cut**

Universalfräser, für alle Werkstoffgruppen einsetzbar  
Universal End Mill, for all Material Groups



## Mehr als 100 Jahre Präzision und Innovation. More than 100 years of precision and innovation.

FRANKEN als Teil der EMUGE-FRANKEN Unternehmensgruppe beschäftigt sich seit seiner Gründung mit der Entwicklung und Produktion von Fräs Werkzeugen. Präzision und Innovation prägen das breite Angebot von Fräsern aus Hartmetall und HSS sowie PKD-, CBN- oder wendeplattenbestückten Fräskörpern.

Die Fertigung am deutschen Produktionsstandort in Rückersdorf reicht von Standard-Schaft- und Bohrungsfräsern bis hin zu hochgenauen Form- und Profil-Sonderfräsern. Mit seiner Typen- und Schneidstoffvielfalt, dem hohen Standard und der kompromisslosen Präzision entspricht das Fräserprogramm den höchsten Qualitätsanforderungen.

Als Ergänzung zu den Fräs Werkzeugen führen wir ein durchgängiges Programm an Fräserspannmitteln und Zubehör für die verschiedensten Adaptierungsmöglichkeiten.

Ever since its foundation FRANKEN as part of the EMUGE-FRANKEN company association has been developing and manufacturing milling tools. The wide range of end mills of solid carbide and HSS as well as PCD and CBN inserts or milling cutters with indexable inserts is characterised by precision and innovation.

The production in our German manufacturing plant in Rückersdorf includes standard end mills and bore cutters as well as highly precise special form and profile milling tools. With its large variety of tool types and cutting materials, the consistently high standards and uncompromising precision, our product range of milling cutters meets even the highest quality requirements.

In addition to our selection of milling tools, we also offer a comprehensive range of clamping systems, tool holders and accessories.



Produktionsstandort in Deutschland  
Production location in Germany





TOP-Cut-Fräser sind Universalfräser aus Hartmetall, die durch ihre speziellen Geometrieigenschaften in nahezu allen Materialien und Fräsverfahren eingesetzt werden können.

#### Besonderheiten:

- Ungleicher Drallwinkel
- Konisch ansteigender Spannutengrund
- Hochleistungs-Beschichtung
- Optional mit innerer Kühlschmierstoff-Zufuhr mit axialem Austritt (ICA)

#### Hauptmerkmal:

Für alle Werkstoffgruppen einsetzbar.

Durch die Vielzahl an verschiedenen Ausführungen und Abmessungen wird ein sehr breites Anwendungsgebiet gewährleistet. Von 2-schneidigen Langlochfräsern über mehrschneidige Schlichtfräser bis zu Hochleistungsfräsern mit Einsatziefen von  $6 \times d_1$  decken die TOP-Cut-Werkzeuge einen großen Einsatzbereich ab.

Schafffräser mit einer großen Anzahl an verschiedenen Eckenradien (bis zu 10 pro Durchmesser) runden das Lagerprogramm dieser Produktlinie perfekt ab.

Mit dieser Broschüre zeigen wir eine Auswahl der wichtigsten Hartmetall-TOP-Cut-Schafffräser. Zu jedem Werkzeug geben wir, in Abhängigkeit zur jeweiligen Werkstoffgruppe, sichere Startbedingungen ( $v_c / f_z$ ) und Hinweise zum empfohlenen Kühlschmierstoff an.

TOP-Cut tools are versatile end mills made from solid carbide which can be used in nearly all materials and milling strategies due to their special geometry properties.

#### Characteristics

- Variable helix angle
- Tapered core diameter
- High-performance coating
- Optionally available with internal coolant supply, axial exit (ICA)

#### Main feature:

Universal use, for all material groups.

The huge number of different versions and dimensions guarantees a very wide range of applications.

TOP-Cut tools cover a huge area of usage from 2-flute slot drills via multi-flute finishing end mills to high-performance end mills with insert depths of  $6 \times d_1$ .

End mills with a large number of different corner radii (up to 10 per diameter) perfectly round off the stock programme of this product line.

In this brochure we present a selection of the most important solid carbide TOP-Cut end mills. We provide reliable starting conditions ( $v_c / f_z$ ) and guidelines concerning the recommended coolant for every tool depending on the respective material group.

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# Wegweiser

**Bitte beachten:**

Die Eignung ist folgendermaßen gekennzeichnet:

- = sehr gut geeignet
- = gut geeignet

# Product finder

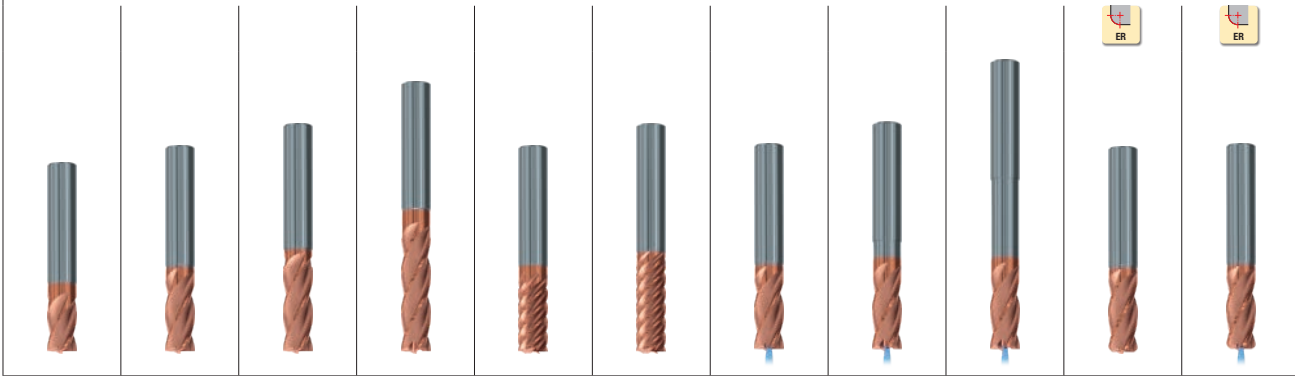
**Please note:**

The suitability is indicated as follows:

- = very suitable
- = suitable

Einsatzgebiete – Material Applications – material			Material-Beispiele Material examples	Material-Nummern Material numbers
P	<b>Stahlwerkstoffe</b> Steel materials			
	1.1 Kaltfließpressstähle, Baustähle, Automatenstähle, u.a.	Cold-extrusion steels, Construction steels, Free-cutting steels, etc.	≤ 600 N/mm <sup>2</sup>	Cq15 1.1132 S235JR (St37-2) 1.0037 10SPb20 1.0722
	2.1 Baustähle, Einsatzstähle, Stahlguss, u.a.	Construction steels, Case-hardened steels, Steel castings, etc.	≤ 800 N/mm <sup>2</sup>	E360 (St70-2) 1.0070 16MnCr5 1.7131 GS-25CrMo4 1.7218
	3.1 Einsatzstähle, Vergütungsstähle, Kaltarbeitsstähle, u.a.	Case-hardened steels, Heat-treatable steels, Cold work steels, etc.	≤ 1000 N/mm <sup>2</sup>	20MoCr3 1.7320 42CrMo4 1.7225 102Cr6 1.2067 50CrMo4 1.7228
	4.1 Vergütungsstähle, Kaltarbeitsstähle, Nitrierstähle, u.a.	Heat-treatable steels, Cold work steels, Nitriding steels, etc.	≤ 1200 N/mm <sup>2</sup>	X45NiCrMo4 1.2767 31CrMo12 1.8515
5.1 Hochlegierte Stähle, Kaltarbeitsstähle, Warmarbeitsstähle, u.a.	High-alloyed steels, Cold work steels, Hot work steels, etc.	≤ 1400 N/mm <sup>2</sup>	X38CrMoV5-3 1.2367 X100CrMoV8-1-1 1.2990 X40CrMoV5-1 1.2344	
M	<b>Nichtrostende Stahlwerkstoffe</b> Stainless steel materials			
	1.1 Ferritisch, martensitisch	Ferritic, martensitic	≤ 950 N/mm <sup>2</sup>	X2CrTi12 1.4512
	2.1 Austenitisch	Austenitic	≤ 950 N/mm <sup>2</sup>	X6CrNiMoTi17-12-2 1.4571
	3.1 Austenitisch-ferritisch (Duplex)	Austenitic-ferritic (Duplex)	≤ 1100 N/mm <sup>2</sup>	X2CrNiMoN22-5-3 1.4462
4.1 Austenitisch-ferritisch hitzebeständig (Super Duplex)	Austenitic-ferritic heat-resistant (Super Duplex)	≤ 1250 N/mm <sup>2</sup>	X2CrNiMoN25-7-4 1.4410	
K	<b>Gusswerkstoffe</b> Cast materials			
	1.1 Gusseisen mit Lamellengrafit (GJL)	Cast iron with lamellar graphite (GJL)	100-250 N/mm <sup>2</sup>	EN-GJL-200 (GG20) EN-JL-1030
	2.1 Gusseisen mit Kugelgrafit (GJS)	Cast iron with nodular graphite (GJS)	250-450 N/mm <sup>2</sup>	EN-GJL-300 (GG30) EN-JL-1050
	2.2 Gusseisen mit Kugelgrafit (GJS)	Cast iron with nodular graphite (GJS)	350-500 N/mm <sup>2</sup>	EN-GJS-400-15 (GGG40) EN-JS-1030
	3.1 Gusseisen mit Vermiculargrafit (GJV)	Cast iron with vermicular graphite (GJV)	500-900 N/mm <sup>2</sup>	EN-GJS-700-2 (GGG70) EN-JS-1070
	3.2 Gusseisen mit Vermiculargrafit (GJV)	Cast iron with vermicular graphite (GJV)	300-400 N/mm <sup>2</sup>	GJV 300
	4.1 Temperguss (GTMW, GTMB)	Malleable cast iron (GTMW, GTMB)	400-500 N/mm <sup>2</sup>	GJV 450
4.2 Temperguss (GTMW, GTMB)	Malleable cast iron (GTMW, GTMB)	250-500 N/mm <sup>2</sup>	EN-GJMW-350-4 (GTW-35) EN-JM-1010	
4.2 Temperguss (GTMW, GTMB)	Malleable cast iron (GTMW, GTMB)	500-800 N/mm <sup>2</sup>	EN-GJMB-450-6 (GTS-45) EN-JM-1140	
N	<b>Nichteisenwerkstoffe</b> Non-ferrous materials			
	1.1 Aluminium-Legierungen	Aluminium alloys		
	1.2 Aluminium-Knetlegierungen	Wrought aluminium alloys	≤ 200 N/mm <sup>2</sup>	EN AW-AiMn1 EN AW-3103
	1.3 Aluminium-Knetlegierungen	Wrought aluminium alloys	≤ 350 N/mm <sup>2</sup>	EN AW-AiMgSi EN AW-6060
	1.4 Aluminium-Knetlegierungen	Wrought aluminium alloys	≤ 550 N/mm <sup>2</sup>	EN AW-AlZn5Mg3Cu EN AW-7022
	1.5 Aluminium-Gusslegierungen	Aluminium cast alloys	Si ≤ 7%	EN AC-AiMg5 EN AC-51300
	1.6 Aluminium-Gusslegierungen	Aluminium cast alloys	7% < Si ≤ 12%	EN AC-AiSi9Cu3 EN AC-46500
	1.6 Aluminium-Gusslegierungen	Aluminium cast alloys	12% < Si ≤ 17%	GD-AiSi17Cu4FeMg
	2.1 Reinkupfer, niedriglegiertes Kupfer	Pure copper, low-alloyed copper	≤ 400 N/mm <sup>2</sup>	E-Cu 57
	2.2 Kupfer-Zink-Legierungen (Messing, langspanend)	Copper-zinc alloys (brass, long-chipping)	≤ 550 N/mm <sup>2</sup>	CuZn37 (Ms63) EN CW 508 L
	2.3 Kupfer-Zink-Legierungen (Messing, kurzspanend)	Copper-zinc alloys (brass, short-chipping)	≤ 550 N/mm <sup>2</sup>	CuZn36Pb3 (Ms58) EN CW 603 N
	2.4 Kupfer-Aluminium-Legierungen (Alubronze, langspanend)	Copper-aluminium alloys (alu bronze, long-chipping)	≤ 800 N/mm <sup>2</sup>	CuAl10Ni5Fe4 EN CW 307 G
	2.5 Kupfer-Zinn-Legierungen (Zinnbronze, langspanend)	Copper-tin alloys (tin bronze, long-chipping)	≤ 700 N/mm <sup>2</sup>	CuSn8P EN CW 459 K
	2.6 Kupfer-Zinn-Legierungen (Zinnbronze, kurzspanend)	Copper-tin alloys (tin bronze, short-chipping)	≤ 400 N/mm <sup>2</sup>	CuSn7ZnPb (Rg7) 2.1090
	2.7 Kupfer-Sonderlegierungen	Special copper alloys	≤ 600 N/mm <sup>2</sup>	(AMPCO® 8)
	2.8 Kupfer-Sonderlegierungen	Special copper alloys	≤ 1400 N/mm <sup>2</sup>	(AMPCO® 45)
3.1 Magnesium-Legierungen	Magnesium alloys			
3.2 Magnesium-Knetlegierungen	Magnesium wrought alloys	≤ 500 N/mm <sup>2</sup>	MgAl6Zn 3.5612	
3.2 Magnesium-Gusslegierungen	Magnesium cast alloys	≤ 500 N/mm <sup>2</sup>	EN-MCMgAl9Zn1 EN-MC21120	
4.1 Kunststoffe	Synthetics			
4.2 Duroplaste (kurzspanend)	Duroplastics (short-chipping)		Bakelit, Pertinax	
4.2 Thermoplaste (langspanend)	Thermoplastics (long-chipping)		PMMA, POM, PVC	
4.3 Faserverstärkte Kunststoffe (Faseranteil ≤ 30%)	Fibre-reinforced synthetics (fibre content ≤ 30%)		GFK, CFK, AFK	
4.4 Faserverstärkte Kunststoffe (Faseranteil > 30%)	Fibre-reinforced synthetics (fibre content > 30%)		GFK, CFK, AFK	
5.1 Besondere Werkstoffe	Special materials			
5.2 Graphit	Graphite		C 8000	
5.2 Wolfram-Kupfer-Legierungen	Tungsten-copper alloys		W-Cu 80/20	
5.3 Verbundwerkstoffe	Composite materials		Hyllite, Alucobond	
S	<b>Spezialwerkstoffe</b> Special materials			
	1.1 Titan-Legierungen	Titanium alloys		
	1.2 Reintitan	Pure titanium	≤ 450 N/mm <sup>2</sup>	Ti1 3.7025
	1.3 Titan-Legierungen	Titanium alloys	≤ 900 N/mm <sup>2</sup>	TiAl6V4 3.7165
	1.3 Titan-Legierungen	Titanium alloys	≤ 1250 N/mm <sup>2</sup>	TiAl4Mo4Sn2 3.7185
	2.1 Nickel-, Kobalt- und Eisen-Legierungen	Nickel alloys, cobalt alloys and iron alloys		
	2.1 Reinnickel	Pure nickel	≤ 600 N/mm <sup>2</sup>	Ni 99.6 2.4060
	2.2 Nickel-Basis-Legierungen	Nickel-base alloys	≤ 1000 N/mm <sup>2</sup>	Monel 400 2.4360
	2.3 Nickel-Basis-Legierungen	Nickel-base alloys	≤ 1600 N/mm <sup>2</sup>	Inconel 718 2.4668
	2.4 Kobalt-Basis-Legierungen	Cobalt-base alloys	≤ 1000 N/mm <sup>2</sup>	Udimet 605
2.5 Eisen-Basis-Legierungen	Iron-base alloys	≤ 1600 N/mm <sup>2</sup>	Haynes 25 2.4964	
2.6 Eisen-Basis-Legierungen	Iron-base alloys	≤ 1500 N/mm <sup>2</sup>	Incoloy 800 1.4958	
H	<b>Harte Werkstoffe</b> Hard materials			
	1.1 Hochfeste Stähle, gehärtete Stähle, Hartguss	High strength steels, hardened steels, hard castings	44 - 50 HRC	Weldox 1100
	1.2 Hochfeste Stähle, gehärtete Stähle, Hartguss	High strength steels, hardened steels, hard castings	50 - 55 HRC	Hardox 550
	1.3 Hochfeste Stähle, gehärtete Stähle, Hartguss	High strength steels, hardened steels, hard castings	55 - 60 HRC	Armax 600T
	1.4 Hochfeste Stähle, gehärtete Stähle, Hartguss	High strength steels, hardened steels, hard castings	60 - 63 HRC	Ferro-Titanit
	1.5 Hochfeste Stähle, gehärtete Stähle, Hartguss	High strength steels, hardened steels, hard castings	63 - 66 HRC	HSSE

Hartmetall-Schafffräser „ENORM“  
Solid Carbide End Mills "ENORM"



Allround

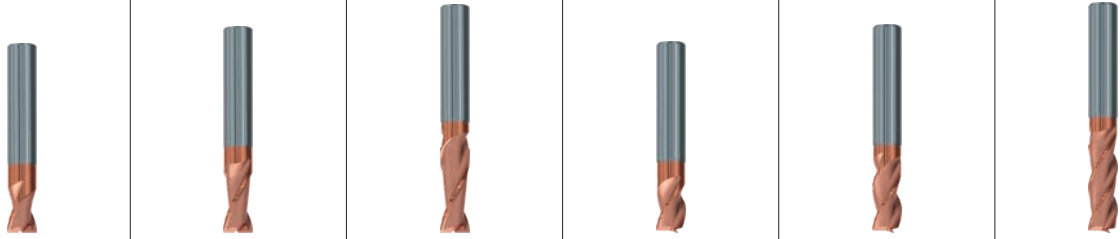
N

ø3 - 20 mm	ø3 - 25 mm	ø3 - 20 mm	ø6 - 20 mm	ø5 - 20 mm	ø6 - 20 mm	ø3 - 20 mm	ø6 - 20 mm	ø3 - 20 mm	ø3 - 20 mm	ø3 - 20 mm	Z (Flutes)
4	4 - 6	4 - 5	4 - 5	6 - 8	6 - 8	4	4	4	4	4	
1916A	1998A	2526A	2528A	2522A	2524A	1998AZ	3806AZ	3808AZ	2698A	2698AZ	
1917A	1999A	2527A	2529A	2523A	2525A	1999AZ	3807AZ	3809AZ	2699A	2699AZ	
8	8	9	9	10	10	11	12	13	14- 15	14- 15	Seite · Page
20	21	22	22	21	22	21	23	24	21	21	V <sub>c</sub> / f <sub>z</sub>

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■	■	■	■	■	■	■	■	■	■	■	1.5	

■ = sehr gut geeignet · very suitable  
□ = gut geeignet · suitable

Hartmetall-Schaft- und Langlochfräser  
Solid Carbide End Mills and slot drills



Allround

N

	ø0,3-20 mm	ø2-20 mm	ø3-20 mm	ø1,5-20 mm	ø1-20 mm	ø3-20 mm
Z (Flutes)	2	2	2	3	3	3
	2510A	2512A	2514A	2516A	2518A	2520A
	2511A	2513A	2515A	2517A	2519A	2521A
Seite - Page	16	17	17	18	18	19
$v_c / f_z$	20	21	22	20	21	22
<b>P</b>	1.1	■	■	■	■	■
	2.1	■	■	■	■	■
	3.1	■	■	■	■	■
	4.1	■	■	■	■	■
	5.1	■	■	■	■	■
<b>M</b>	1.1	■	■	■	■	■
	2.1	■	■	■	■	■
	3.1	■	■	■	■	■
	4.1	■	■	■	■	■
<b>K</b>	1.1	■	■	■	■	■
	1.2	■	■	■	■	■
	2.1	■	■	■	■	■
	2.2	■	■	■	■	■
	3.1	■	■	■	■	■
	3.2	■	■	■	■	■
	4.1	■	■	■	■	■
	4.2	■	■	■	■	■
<b>N</b>	1.1	■	■	■	■	■
	1.2	■	■	■	■	■
	1.3	■	■	■	■	■
	1.4	□	□	□	■	■
	1.5			□		■
	1.6			□		■
	2.1	■	■	■	■	■
	2.2	■	■	■	■	■
	2.3	■	■	■	■	■
	2.4	■	■	■	■	■
	2.5	■	■	■	■	■
	2.6	■	■	■	■	■
	2.7	■	■	■	■	■
	2.8	■	■	■	■	■
	3.1	■	■		□	□
	3.2	■	■		□	□
	4.1	■	■		□	□
	4.2	■	■		□	□
	4.3					
	4.4					
5.1						
5.2	■	■	■	■	■	
5.3						
<b>S</b>	1.1	■	■	■	■	■
	1.2	■	■	■	□	□
	1.3	■	■	■	□	□
	2.1	■	■	■	■	■
	2.2	□	□	□	□	□
	2.3	□	□	□	□	□
	2.4	□	□	□	□	□
2.5	□	□	□	□	□	
2.6	□	□	□	□	□	
<b>H</b>	1.1	■	■	■	■	■
	1.2	■	■	■	■	■
	1.3	□	□	□	□	□
	1.4					
	1.5					



**24/7**

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[www.emuge-franken.com](http://www.emuge-franken.com)



Mit dem bei den Werkzeugen abgebildeten QR-Code gelangen Sie direkt zu den jeweiligen Artikeln in unserem Webshop. Dort finden Sie umfassende Werkzeuginformationen und Schnittdaten.

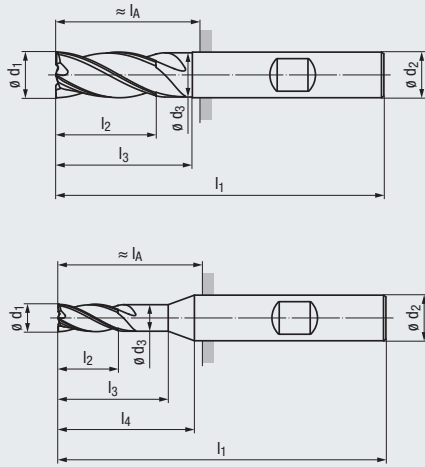
Bei Registrierung stehen Ihnen noch weitere Produktdaten und Funktionen zur Verfügung. Dazu zählen neben standardisierten Werkzeugdaten (2D / 3D / Sachmerkmale) auch eine Bestell- oder Angebotshistorie, individuelle Merklisten sowie weitere nützliche Funktionen.

The QR code shown with the tools will take you directly to the respective articles in our web store where you can find comprehensive tool information and cutting data.

Registration provides you with additional product data and functions. These include standardised tool data (2D / 3D / characteristics), an order or quotation history and individual watch lists as well as other useful functions.

- Multifunktionales Hochleistungswerkzeug
- Mit ENORM-Geometrie
- Vibrationsarme Bearbeitung
- Schneiden zur Mitte
- 4 Baulängen verfügbar

- Multi-functional, high performance tool
- With ENORM geometry
- Low-vibration machining
- Centre cutting
- 4 lengths available



**N**

**HM**

DIN 6535  
HA  
HB

3-5°

35-38°

KB x 45°

Vc/fz  
20 - 21



Allround

Allround

Beschichtung · Coating

Einsatzgebiete – Material (siehe Seite 4)

- In fast allen Werkstoffen einsetzbar
- Zum Schruppen und Schlichten geeignet

Applications – material (see page 4)

- For almost all materials
- Suitable for roughing and finishing

**TIALN**

**TIALN**

P	1.1-5.1
M	1.1-4.1
K	1.1-4.2
N	1.2-1.4 1.1
N	2.1-4.1, 5.2 4.2
S	1.1-2.6
H	1.1 1.2-1.3

P	1.1-5.1
M	1.1-4.1
K	1.1-4.2
N	1.2-1.4 1.1
N	2.1-4.1, 5.2 4.2
S	1.1-2.6
H	1.1 1.2-1.3

### DIN 6527 – Kurze Ausführung · Short design

Bestell-Code · Order code											1916A	1917A		
∅ d1 f8	l2	l3	l1	∅ d3	l4	∅ d2 h5	lA	KB	Z (Flutes)	Dimens.- Code				
3	5	9	50	2,9	14	6	14	0,07	4	.003	●	●		
4	8	12	54	3,8	18	6	18	0,07	4	.004	●	●		
5	9	16	54	4,8	18	6	18	0,12	4	.005	●	●		
6	10	16	54	5,8	–	6	18	0,12	4	.006	●	●		
7	12	18	58	6,8	20	8	22	0,125	4	.007	● new	● new		
8	12	20	58	7,7	–	8	22	0,12	4	.008	●	●		
9	15	22	66	8,7	24	12	26	0,2	4	.009	● new	● new		
10	15	24	66	9,5	–	10	26	0,2	4	.010	●	●		
12	18	26	73	11,5	–	12	28	0,2	4	.012	●	●		
14	21	28	75	13,5	–	14	28	0,2	4	.014	● new	● new		
16	24	32	82	15,5	–	16	34	0,2	4	.016	●	●		
18	27	34	84	17,5	–	18	36	0,2	4	.018	●	●		
20	30	40	92	19,5	–	20	42	0,3	4	.020	●	●		

### DIN 6527 – Lange Ausführung · Long design

Bestell-Code · Order code													1998A	1999A
∅ d1 f8	l2	l3	l1	∅ d3	l4	∅ d2 h5	lA	KB	Z (Flutes)	Dimens.- Code				
3	8	14	57	2,9	20	6	21	0,07	4	.003			●	●
4	11	18	57	3,8	20	6	21	0,07	4	.004			●	●
5	13	19	57	4,8	20	6	21	0,12	4	.005			●	●
6	13	20	57	5,8	–	6	21	0,12	4	.006			●	●
7	19	23	63	6,7	25	8	27	0,12	4	.007			●	●
8	19	25	63	7,7	–	8	27	0,12	4	.008			●	●
8	19	25	63	7,7	–	8	27	0,12	5	.008005			●	●
9	22	28	72	8,7	30	10	32	0,2	4	.009			●	●
10	22	30	72	9,5	–	10	32	0,2	4	.010			●	●
10	22	30	72	9,5	–	10	32	0,2	5	.010005			●	●
11	26	32	83	10,5	35	12	38	0,2	4	.011			●	●
12	26	35	83	11,5	–	12	38	0,2	4	.012			●	●
12	26	35	83	11,5	–	12	38	0,2	5	.012005			●	●
14	26	35	83	13,5	–	14	38	0,2	4	.014			●	●
14	26	35	83	13,5	–	14	38	0,2	5	.014005			●	●
15	32	38	92	14,5	40	16	44	0,2	4	.015			●	●
16	32	40	92	15,5	–	16	44	0,2	4	.016			●	●
16	32	40	92	15,5	–	16	44	0,2	5	.016005			●	●
18	32	50	100	17,5	–	18	52	0,2	4	.018			●	●
18	32	50	100	17,5	–	18	52	0,2	5	.018005			●	●
20	38	50	104	19,5	–	20	54	0,3	4	.020			●	●
20	38	50	104	19,5	–	20	54	0,3	5	.020005			●	●
25	45	65	125	24,2	–	25	69	0,3	4	.025004			●	●
25	45	65	125	24,2	–	25	69	0,3	6	.025			●	●



- Multifunktionales Hochleistungswerkzeug
- Mit ENORM-Geometrie
- Vibrationsarme Bearbeitung
- Schneiden zur Mitte
- 4 Baulängen verfügbar

- Multi-functional, high performance tool
- With ENORM geometry
- Low-vibration machining
- Centre cutting
- 4 lengths available

**N**

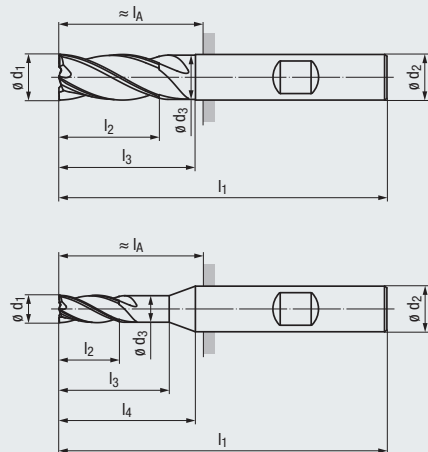
**HM**

**DIN 6535**  
HA  
HB

**38-42°**

**KB x 45°**

**$v_c / f_z$**   
22



Allround

Allround

**Beschichtung · Coating**

**Einsatzgebiete – Material (siehe Seite 4)**

- In fast allen Werkstoffen einsetzbar
- Zum Schlichten geeignet

**Applications – material (see page 4)**

- For almost all materials
- Suitable for finishing

**TIALN**

**TIALN**

<b>P</b>	1.1-5.1
<b>M</b>	1.1-4.1
<b>K</b>	1.1-4.2
<b>N</b>	1.1-1.4 1.5-1.6
<b>N</b>	2.1-2.8, 5.2
<b>S</b>	1.1-1.3 2.1-2.6

<b>P</b>	1.1-5.1
<b>M</b>	1.1-4.1
<b>K</b>	1.1-4.2
<b>N</b>	1.1-1.4 1.5-1.6
<b>N</b>	2.1-2.8, 5.2
<b>S</b>	1.1-1.3 2.1-2.6

**$l_2 = 3 \times d_1$  – Extra lange Ausführung · Extra long design**

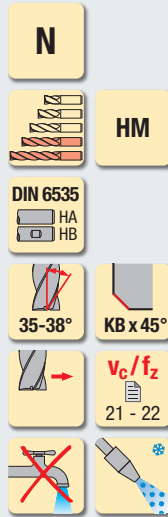
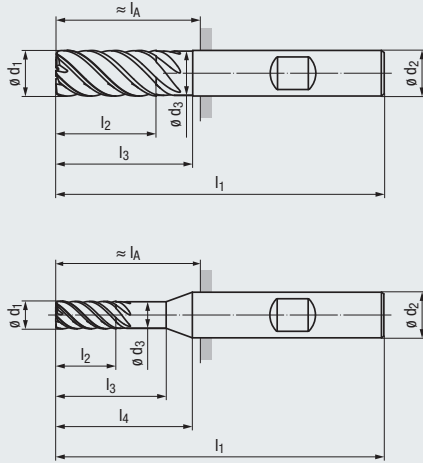
Bestell-Code · Order code											2526A	2527A		
$\varnothing d_1$ h10	$l_2$	$l_3$	$l_1$	$\varnothing d_3$	$l_4$	$\varnothing d_2$ h6	$l_A$ 	KB	Z (Flutes)	Dimens.- Code				
3	9	12	62	2,9	23	6	26	0,07	4	.003	●	●		
4	12	16	62	3,8	25	6	26	0,07	4	.004	●	●		
5	15	20	62	4,8	25	6	26	0,12	4	.005	●	●		
6	18	25	62	5,8	–	6	26	0,12	4	.006	●	●		
8	24	30	68	7,7	–	8	32	0,12	5	.008	●	●		
10	30	35	80	9,5	–	10	40	0,2	5	.010	●	●		
12	36	45	93	11,5	–	12	48	0,2	5	.012	●	●		
16	48	60	112	15,5	–	16	64	0,2	5	.016	●	●		
20	60	75	130	19,5	–	20	80	0,3	5	.020	●	●		

**$l_2 = 4 \times d_1$  – Extra lange Ausführung · Extra long design**

Bestell-Code · Order code													2528A	2529A
$\varnothing d_1$ h10	$l_2$	$l_3$	$l_1$	$\varnothing d_3$	$l_4$	$\varnothing d_2$ h6	$l_A$ 	KB	Z (Flutes)	Dimens.- Code				
6	24	30	68	5,8	–	6	32	0,12	4	.006			●	●
8	32	40	80	7,7	–	8	44	0,12	5	.008			●	●
10	40	50	95	9,5	–	10	55	0,2	5	.010			●	●
12	48	60	107	11,5	–	12	62	0,2	5	.012			●	●
16	64	75	128	15,5	–	16	80	0,2	5	.016			●	●
20	80	90	150	19,5	–	20	100	0,3	5	.020			●	●

- Multifunktionales Hochleistungswerkzeug
- Mit ENORM-Geometrie
- Vibrationsarme Bearbeitung
- Schneidlänge bis  $3 \times d_1$
- 2 Baulängen verfügbar

- Multi-functional, high performance tool
- With ENORM geometry
- Low-vibration machining
- Flute length up to  $3 \times d_1$
- 2 lengths available



Allround

Allround

**Beschichtung · Coating**

**Einsatzgebiete – Material (siehe Seite 4)**

- In allen zähen Werkstoffen einsetzbar
- Zum HSC-Schlichten geeignet

**Applications – material (see page 4)**

- For all tough materials
- Suitable for HSC finishing

**TIALN**

**TIALN**

P	1.1-5.1	
M	1.1-2.1	3.1-4.1
K	1.1-2.1	2.2
K	3.1-4.1	4.2
N	1.1-1.4	
N	2.1-3.2	4.1-4.2, 5.2
S	1.1-2.2	2.3
S	2.4	2.5-2.6
H		1.1-1.3

P	1.1-5.1	
M	1.1-2.1	3.1-4.1
K	1.1-2.1	2.2
K	3.1-4.1	4.2
N	1.1-1.4	1.5-1.6
N	2.1-2.8	5.2
S	1.1-2.2	2.3
S	2.4	2.5-2.6

**DIN 6527 – Lange Ausführung · Long design**

**Bestell-Code · Order code**

$\varnothing d_1$ f8	$l_2$	$l_3$	$l_1$	$\varnothing d_3$	$l_4$	$\varnothing d_2$ h5	$l_A$ h6	KB	Z (Flutes)	Dimens.- Code	2522A	2523A
5	13	18	57	4,8	20	6	21	0,12	6	.005	●	●
6	13	20	57	5,8	–	6	21	0,12	6	.006	●	●
8	19	25	63	7,7	–	8	27	0,12	6	.008	●	●
10	22	30	72	9,7	–	10	32	0,2	6	.010	●	●
12	26	35	83	11,6	–	12	38	0,2	6	.012	●	●
16	32	40	92	15,5	–	16	44	0,2	6	.016	●	●
20	38	50	104	19,5	–	20	54	0,3	8	.020	●	●

**$l_2 = 3 \times d_1$  – Extra lange Ausführung · Extra long design**

**Bestell-Code · Order code**

$\varnothing d_1$ h10	$l_2$	$l_3$	$l_1$	$\varnothing d_3$	$l_4$	$\varnothing d_2$ h6	$l_A$ h6	KB	Z (Flutes)	Dimens.- Code	2524A	2525A
6	18	25	62	5,8	–	6	26	0,12	6	.006	●	●
8	24	30	68	7,7	–	8	32	0,12	6	.008	●	●
10	30	35	80	9,7	–	10	40	0,2	6	.010	●	●
12	36	45	93	11,6	–	12	48	0,2	6	.012	●	●
16	48	55	108	15,5	–	16	60	0,2	6	.016	●	●
20	60	70	126	19,5	–	20	76	0,3	8	.020	●	●

- Multifunktionales Hochleistungswerkzeug
- Mit ENORM-Geometrie
- Vibrationsarme Bearbeitung
- Innere Kühlschmierstoff-Zufuhr, Austritt axial (ICA)
- 3 Baulängen verfügbar

- Multi-functional, high performance tool
- With ENORM geometry
- Low-vibration machining
- Internal coolant supply, axial exit (ICA)
- 3 lengths available

**N**

**ICA**

**HM**

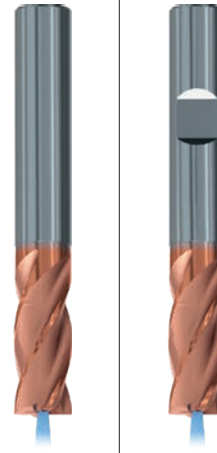
**DIN 6535**  
HA HB

**3-5°**

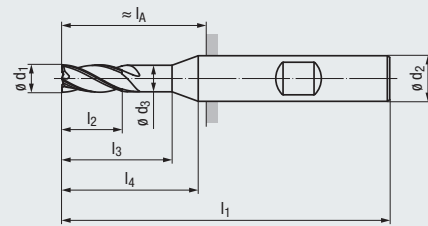
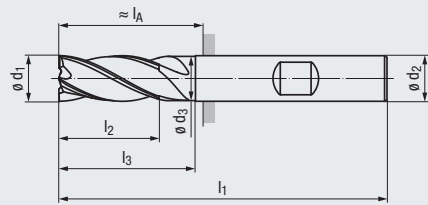
**35-38°**

**KB x 45°**

**V<sub>c</sub>/f<sub>z</sub>**  
21



**Allround**



**Beschichtung · Coating**

**Einsatzgebiete – Material (siehe Seite 4)**

- In fast allen Werkstoffen, inklusive zähe Werkstoffe, einsetzbar
- Zum Schruppen und Schlichten geeignet

**Applications – material (see page 4)**

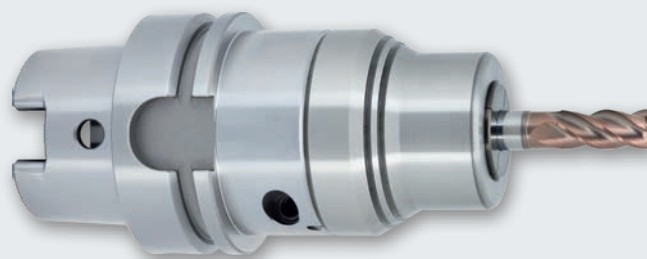
- For almost all materials, including tough materials
- Suitable for roughing and finishing

**TIALN**

<b>P</b>	1.1-5.1	
<b>M</b>	1.1-4.1	
<b>K</b>	1.1-4.2	
<b>N</b>	1.2-1.4	1.1
<b>N</b>	2.1-4.1, 5.2	4.2
<b>S</b>	1.1-2.6	
<b>H</b>	1.1	1.2-1.3

**DIN 6527 – Lange Ausführung · Long design**

Bestell-Code · Order code											1998AZ	1999AZ		
∅ d <sub>1</sub> f8	l <sub>2</sub>	l <sub>3</sub>	l <sub>1</sub>	∅ d <sub>3</sub>	l <sub>4</sub>	∅ d <sub>2</sub> h5	l <sub>A</sub>	KB	Z (Flutes)	Dimens.- Code				
3	8	14	57	2,9	20	6	21	0,07	4	.003	●	●		
4	11	18	57	3,8	20	6	21	0,07	4	.004	●	●		
5	13	19	57	4,8	20	6	21	0,12	4	.005	●	●		
6	13	20	57	5,8	–	6	21	0,12	4	.006	●	●		
8	19	25	63	7,7	–	8	27	0,12	4	.008	●	●		
10	22	30	72	9,5	–	10	32	0,2	4	.010	●	●		
12	26	35	83	11,5	–	12	38	0,2	4	.012	●	●		
16	32	40	92	15,5	–	16	44	0,2	4	.016	●	●		
20	38	50	104	19,5	–	20	54	0,3	4	.020	●	●		



**Präzisions-Spannhülsen-Aufnahmen FPC**

Die patentierten Präzisions-Spannhülsen-Aufnahmen FPC sind hochgenaue Werkzeug-Aufnahmen mit mechanischer Klemmung für höchste Spannkraft und Rundlaufgenauigkeit sowie mit sehr guten Dämpfungseigenschaften. Die Werkzeugspannung erfolgt mittels Spannhülsen.

Das Spannen und Lösen des Werkzeugs geschieht mit einem Sechskantschlüssel, welcher seitlich den Spannmechanismus bedient – und das innerhalb weniger Sekunden. Es können alle Zylinderschäfte nach DIN 6535 oder DIN 1835 gespannt werden.

Die Präzisions-Spannhülsen-Aufnahmen FPC eignen sich hervorragend zum Hochleistungs- und Hochgeschwindigkeitsfräsen. Darüber hinaus können diese auch zum Bohren, Reiben oder zur Gewindeherstellung eingesetzt werden.

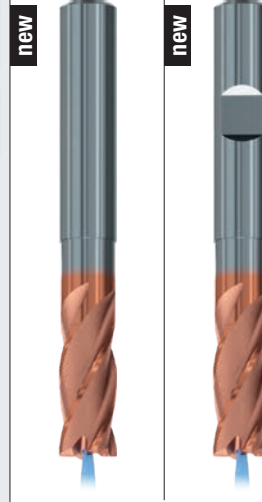
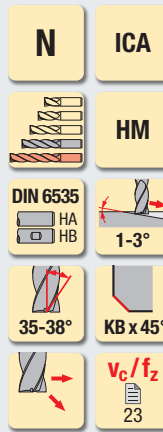
**High Precision Collet Holders FPC**

The patented precision collet holders FPC are highly precise tool holders with mechanical clamping which provide superior clamping force and concentricity as well as excellent shock-absorbing properties. The tools are clamped via collets.

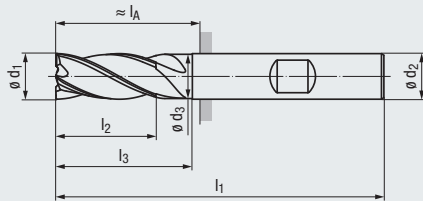
Tools are clamped and unclamped with a hexagon wrench which operates the clamping mechanism at the side – and in just a few seconds. All straight shanks according to DIN 6535 or DIN 1835 can be clamped.

The high-precision collet holders FPC are well suited for high-performance and high-speed milling. In addition they can be used for drilling, reaming and threading operations.

- Multifunktionales Hochleistungswerkzeug
  - Mit ENORM-Geometrie
  - Vibrationsarme Bearbeitung
  - Innere Kühlschmierstoff-Zufuhr, Austritt axial (ICA)
  - 3 Baulängen verfügbar
- Multi-functional, high performance tool
  - With ENORM geometry
  - Low-vibration machining
  - Internal coolant supply, axial exit (ICA)
  - 3 lengths available



Allround



**Beschichtung · Coating**

**Einsatzgebiete – Material (siehe Seite 4)**

- In fast allen Werkstoffen, inklusive zähe Werkstoffe, einsetzbar
- Zum Schruppen und Schlichten geeignet

**Applications – material (see page 4)**

- For almost all materials, including tough materials
- Suitable for roughing and finishing

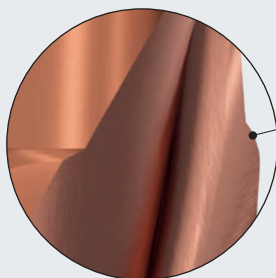
TIALN

P	1.1-5.1	
M	1.1-4.1	
K	1.1-4.2	
N	1.2-1.4	1.1
N	2.1-4.1, 5.2	4.2
S	1.1-2.6	
H	1.1	1.2-1.3

**Extra lange Ausführung · Extra long design**

Bestell-Code · Order code										3806AZ	3807AZ		
$\varnothing d_1$ h10	$l_2$	$l_3$	$l_1$	$\varnothing d_3$	$\varnothing d_2$ h6	$l_A$	KB	Z (Flutes)	Dimens.- Code				
6	13	25	62	5,8	6	26	0,12	4	.006	●	●		
8	19	30	68	7,7	8	32	0,12	4	.008	●	●		
10	22	38	80	9,5	10	40	0,2	4	.010	●	●		
12	26	46	93	11,5	12	48	0,2	4	.012	●	●		
14	26	52	99	13,5	14	54	0,2	4	.014	●	●		
16	32	58	108	15,5	16	60	0,2	4	.016	●	●		
18	32	68	118	17,5	18	70	0,2	4	.018	●	●		
20	38	74	126	19,5	20	76	0,3	4	.020	●	●		

**Übergangsradius**  
Transition radius

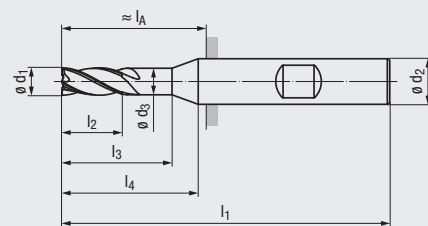
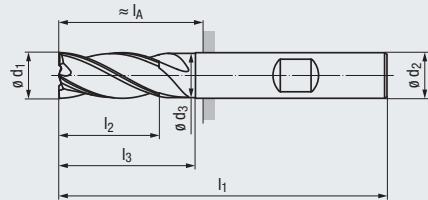
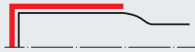


Übergangsradius von der Umfangsschneide in den Hals.  
Bei axialen Zustellungen werden absatzfreie Oberflächen erzeugt.  
Transition radius from the peripheral cutting edge to the neck.  
Axial infeds produce stepless surfaces.

- Multifunktionales Hochleistungswerkzeug
- Mit ENORM-Geometrie
- Vibrationsarme Bearbeitung
- Innere Kühlschmierstoff-Zufuhr, Austritt axial (ICA)
- 3 Baulängen verfügbar

- Multi-functional, high performance tool
- With ENORM geometry
- Low-vibration machining
- Internal coolant supply, axial exit (ICA)
- 3 lengths available

schneidender Bereich  
cutting area of tool



**N**

**ICA**

**HM**

**DIN 6535**

HA HB

**1-2°**

**35-38°**

**KB x 45°**

**$v_c / f_z$**

24



new



new



Allround

Beschichtung · Coating

Einsatzgebiete – Material (siehe Seite 4)

- In fast allen Werkstoffen, inklusive zähe Werkstoffe, einsetzbar
- Zum Schruppen und Schlichten geeignet

Applications – material (see page 4)

- For almost all materials, including tough materials
- Suitable for roughing and finishing

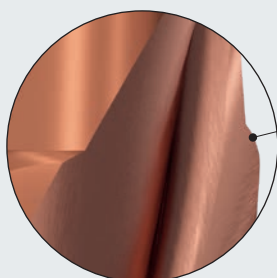
**TIALN**

<b>P</b>	1.1-5.1	
<b>M</b>	1.1-4.1	
<b>K</b>	1.1-4.2	
<b>N</b>	1.2-1.4	1.1
<b>N</b>	2.1-4.1, 5.2	4.2
<b>S</b>	1.1-2.6	
<b>H</b>	1.1	1.2-1.3

**$l_3 = 6 \times d_1$  – Extra lange Ausführung · Extra long design**

Bestell-Code · Order code											3808AZ	3809AZ		
$\varnothing d_1$ h10	$l_2$	$l_3$	$l_1$	$\varnothing d_3$	$l_4$	$\varnothing d_2$ h6	$l_A$ 	KB	Z (Flutes)	Dimens.- Code				
3	8	18	62	2,8	25	6	26	0,12	4	.003	●	●		
4	11	24	62	3,8	25	6	26	0,12	4	.004	●	●		
5	13	30	68	4,8	31	6	32	0,12	4	.005	●	●		
6	13	36	74	5,8	–	6	38	0,12	4	.006	●	●		
8	19	48	86	7,7	–	8	50	0,12	4	.008	●	●		
10	22	60	102	9,5	–	10	62	0,2	4	.010	●	●		
12	26	72	119	11,5	–	12	74	0,2	4	.012	●	●		
14	26	84	131	13,5	–	14	86	0,2	4	.014	●	●		
16	32	96	146	15,5	–	16	98	0,2	4	.016	●	●		
18	32	108	158	17,5	–	18	110	0,2	4	.018	●	●		
20	38	120	172	19,5	–	20	122	0,3	4	.020	●	●		

**Übergangsradius**  
Transition radius

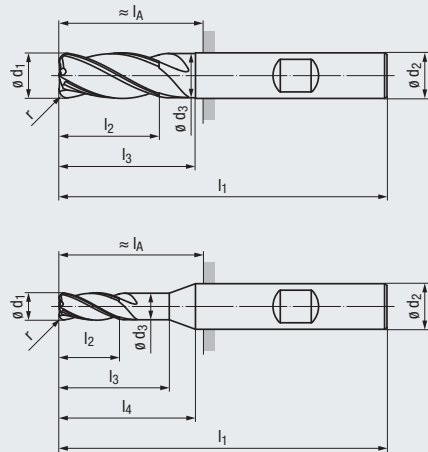


Übergangsradius von der Umfangsschneide in den Hals.  
Bei axialen Zustellungen werden absatzfreie Oberflächen erzeugt.  
Transition radius from the peripheral cutting edge to the neck.  
Axial infeeds produce stepless surfaces.



- Multifunktionales Hochleistungswerkzeug
- Mit ENORM-Geometrie
- Vibrationsarme Bearbeitung
- Verschiedene Eckenradien pro Schneiddurchmesser
- Schneiden zur Mitte oder innere Kühlschmierstoff-Zufuhr, Austritt axial (ICA)

- Multi-functional, high performance tool
- With ENORM geometry
- Low-vibration machining
- Several corner radii per cutting diameter
- Centre cutting or internal coolant supply, axial exit (ICA)



**N**

**ICA**

**HM**

**3-5°**

**35-38°**

**ER**

**V<sub>c</sub>/f<sub>z</sub>**  
 21



Allround



Allround

**Beschichtung · Coating**

**Einsatzgebiete – Material (siehe Seite 4)**

- In fast allen Werkstoffen, inklusive zähe Werkstoffe, einsetzbar
- Sehr gut zum Schruppen und Schlichten geeignet

**Applications – material (see page 4)**

- For almost all materials, including tough materials
- Very suitable for roughing and finishing

**TIALN**

**TIALN**

P	1.1-5.1	
M	1.1-4.1	
K	1.1-4.2	
N	1.2-1.4	1.1
N	2.1-4.1, 5.2	4.2
S	1.1-2.6	
H	1.1	1.2-1.3

P	1.1-5.1	
M	1.1-4.1	
K	1.1-4.2	
N	1.2-1.4	1.1
N	2.1-4.1, 5.2	4.2
S	1.1-2.6	
H	1.1	1.2-1.3

**DIN 6527 – Lange Ausführung · Long design**

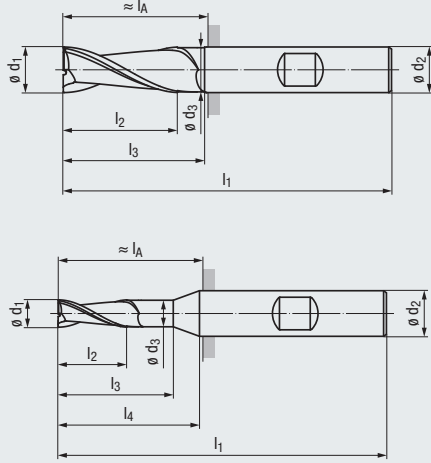
**Eckenradius · Corner radius**

Bestell-Code · Order code											2698A	2699A	2698AZ	2699AZ
$\varnothing d_1$	r	$l_2$	$l_3$	$l_1$	$\varnothing d_3$	$l_4$	$\varnothing d_2$	$l_A$	Z	Dimens.-Code				
f8	$\pm 0,01$						h5		(Flutes)					
16	0,3	32	40	92	15,5	—	16	44	4	.016003	●	●		
16	0,5	32	40	92	15,5	—	16	44	4	.016005	●	●		
16	1	32	40	92	15,5	—	16	44	4	.016010	●	●	●	●
16	1,5	32	40	92	15,5	—	16	44	4	.016015	●	●	●	●
16	2	32	40	92	15,5	—	16	44	4	.016020	●	●	●	●
16	2,5	32	40	92	15,5	—	16	44	4	.016025	●	●	●	●
16	3	32	40	92	15,5	—	16	44	4	.016030	●	●	●	●
16	4	32	40	92	15,5	—	16	44	4	.016040	●	●	●	●
20	0,3	38	50	104	19,5	—	20	54	4	.020003	●	●		
20	0,5	38	50	104	19,5	—	20	54	4	.020005	●	●		
20	1	38	50	104	19,5	—	20	54	4	.020010	●	●	●	●
20	1,5	38	50	104	19,5	—	20	54	4	.020015	●	●	●	●
20	2	38	50	104	19,5	—	20	54	4	.020020	●	●	●	●
20	2,5	38	50	104	19,5	—	20	54	4	.020025	●	●	●	●
20	3	38	50	104	19,5	—	20	54	4	.020030	●	●	●	●
20	4	38	50	104	19,5	—	20	54	4	.020040	●	●	●	●

Andere Eckenradien auf Anfrage lieferbar  
Other corner radii available on request

- Langlochfräser mit 2 Schneiden
- Neuentwickelte Geometrie
- Vibrationsarme Bearbeitung
- Schneiden zur Mitte
- 3 Baulängen verfügbar

- Slot drill with 2 flutes
- Newly developed geometry
- Low-vibration machining
- Centre cutting
- 3 lengths available



**N**

**HM**

DIN 6535  
HA  
HB

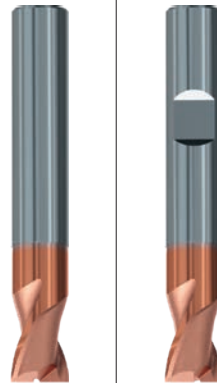
3-5°

Ø 0,3 - 1,8 mm:  
30°

Ø 2 - 20 mm:  
35/38°

KB x 45°

Vc / fz  
20



Allround

**Beschichtung · Coating**

**Einsatzgebiete – Material (siehe Seite 4)**

- In fast allen Werkstoffen einsetzbar
- Zum Schruppen und Schlichten geeignet
- Zur Herstellung von Passfedernuten nach DIN 6885-1
- Gut zum Bohrfräsen geeignet

**Applications – material (see page 4)**

- For almost all materials
- Suitable for roughing and finishing
- For producing keyways acc. DIN 6885-1
- Suitable for z-axis milling

**TIALN**

P	1.1-5.1
M	1.1-4.1
K	1.1-4.2
N	1.1-1.3 1.4
N	2.1-4.2, 5.2
S	1.1-2.1 2.2-2.6
H	1.1-1.2 1.3

**DIN 6527 – Kurze Ausführung · Short design**

Bestell-Code · Order code											2510A	2511A			
Ø d <sub>1</sub> e8	h <sub>10</sub>	l <sub>2</sub>	l <sub>3</sub>	l <sub>1</sub>	Ø d <sub>3</sub>	l <sub>4</sub>	Ø d <sub>2</sub> h6	l <sub>A</sub> □	KB	Z (Flutes)	Dimens.- Code				
0,3	1	—	38	—	8	3	—	—	—	2	.0003	●			
0,5	1,5	—	38	—	9	3	—	—	—	2	.0005	●			
1	3	—	38	—	10	3	—	—	—	2	.001	●			
1,2	4	—	38	—	10	3	—	—	—	2	.0012	●			
1,3	4	—	38	—	10	3	—	—	—	2	.0013	●			
1,4	4	—	38	—	10	3	—	—	—	2	.0014	●			
1,5	4	—	38	—	10	3	—	—	—	2	.0015	●			
1,6	4	—	38	—	10	3	—	—	—	2	.0016	●			
1,8	5	—	38	—	10	3	—	—	—	2	.0018	●			
Ø d <sub>1</sub> e8	h <sub>10</sub>	l <sub>2</sub>	l <sub>3</sub>	l <sub>1</sub>	Ø d <sub>3</sub>	l <sub>4</sub>	Ø d <sub>2</sub> h5	l <sub>A</sub> □	KB	Z (Flutes)	Dimens.- Code				
2	3	5	50	1,9	14	6	14	0,04	2	.002	●	●			
2,5	3	5	50	2,4	14	6	14	0,07	2	.0025	●	●			
	2,8	4	7	50	2,7	14	6	14	0,07	2	.0028	●	●		
3	4	7	50	2,9	14	6	14	0,07	2	.003	●	●			
	3,5	4	7	50	3,3	14	6	14	0,07	2	.0035	●	●		
	3,8	5	9	54	3,6	18	6	18	0,07	2	.0038	●	●		
4	5	9	54	3,8	18	6	18	0,07	2	.004	●	●			
	4,5	5	9	54	4,3	18	6	18	0,12	2	.0045	●	●		
	4,8	6	11	54	4,6	18	6	18	0,12	2	.0048	●	●		
5	6	11	54	4,8	18	6	18	0,12	2	.005	●	●			
	5,75	7	16	54	5,55	—	6	18	0,12	2	.00575	●	●		
6	7	16	54	5,8	—	6	18	0,12	2	.006	●	●			
7	8	18	58	6,7	20	8	22	0,12	2	.007	●	●			
8	9	20	58	7,7	—	8	22	0,12	2	.008	●	●			
	9	10	22	66	8,7	24	10	26	0,2	2	.009	●	●		
10	11	24	66	9,5	—	10	26	0,2	2	.010	●	●			
12	12	26	73	11,5	—	12	28	0,2	2	.012	●	●			
14	14	28	75	13,5	—	14	30	0,2	2	.014	●	●			
16	16	32	82	15,5	—	16	34	0,2	2	.016	●	●			
18	18	34	84	17,5	—	18	36	0,2	2	.018	●	●			
20	20	40	92	19,5	—	20	42	0,3	2	.020	●	●			



- Multifunktionales Hochleistungswerkzeug
- Neuentwickelte Geometrie
- Vibrationsarme Bearbeitung
- Schneiden zur Mitte
- 3 Baulängen verfügbar

- Multi-functional, high performance tool
- Newly developed geometry
- Low-vibration machining
- Centre cutting
- 3 lengths available

**N**

**HM**

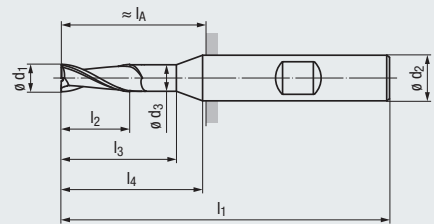
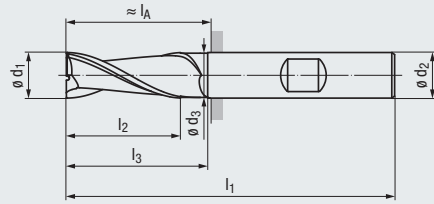
DIN 6535  
HA  
HB

1-2°

35/38°

KB x 45°

$V_c / f_z$   
21 - 22



Allround



Allround

Beschichtung · Coating

Einsatzgebiete – Material (siehe Seite 4)  
- In fast allen Werkstoffen einsetzbar  
- Zum Schruppen und Schlichten geeignet

Applications – material (see page 4)  
- For almost all materials  
- Suitable for roughing and finishing

**TIALN**

**TIALN**

P	1.1-5.1	
M	1.1-4.1	
K	1.1-4.2	
N	1.1-1.3	1.4
N	2.1-4.2, 5.2	
S	1.1-2.1	2.2-2.6
H	1.1-1.2	1.3

P	1.1-5.1	
M	1.1-4.1	
K	1.1-4.2	
N	1.1-1.3	1.4-1.6
N	2.1-2.8, 5.2	
S	1.1-2.1	2.2-2.6

DIN 6527 – Lange Ausführung · Long design

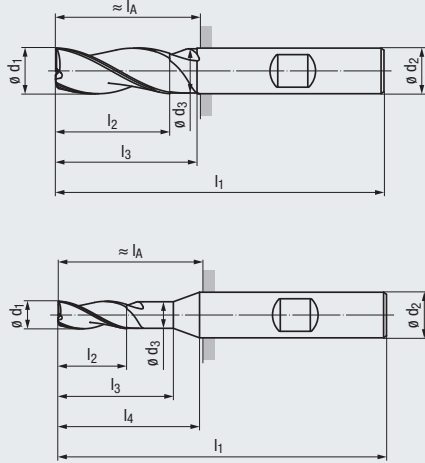
Bestell-Code · Order code											2512A	2513A		
$\varnothing d_1$ h10	$l_2$	$l_3$	$l_1$	$\varnothing d_3$	$l_4$	$\varnothing d_2$ h5	$l_A$ 	KB	Z (Flutes)	Dimens.- Code				
2	6	8	57	1,9	20	6	21	0,04	2	.002	●	●		
3	7	10	57	2,9	20	6	21	0,07	2	.003	●	●		
4	8	12	57	3,8	20	6	21	0,07	2	.004	●	●		
5	10	15	57	4,8	20	6	21	0,12	2	.005	●	●		
6	10	20	57	5,8	—	6	21	0,12	2	.006	●	●		
7	13	23	63	6,7	25	8	27	0,12	2	.007	●	●		
8	16	25	63	7,7	—	8	27	0,12	2	.008	●	●		
10	19	30	72	9,5	—	10	32	0,2	2	.010	●	●		
12	22	35	83	11,5	—	12	38	0,2	2	.012	●	●		
16	26	40	92	15,5	—	16	44	0,2	2	.016	●	●		
20	32	50	104	19,5	—	20	54	0,3	2	.020	●	●		

Extra lange Ausführung · Extra long design

Bestell-Code · Order code													2514A	2515A
$\varnothing d_1$ h10	$l_2$	$l_3$	$l_1$	$\varnothing d_3$	$l_4$	$\varnothing d_2$ h5	$l_A$ 	KB	Z (Flutes)	Dimens.- Code				
3	9	12	62	2,9	23	6	26	0,07	2	.003			●	●
4	12	16	62	3,8	25	6	26	0,07	2	.004			●	●
5	15	20	62	4,8	25	6	26	0,12	2	.005			●	●
6	18	25	62	5,8	—	6	26	0,12	2	.006			●	●
8	24	30	68	7,7	—	8	32	0,12	2	.008			●	●
10	30	40	80	9,5	—	10	40	0,2	2	.010			●	●
12	36	45	93	11,5	—	12	48	0,2	2	.012			●	●
16	48	55	108	15,5	—	16	60	0,2	2	.016			●	●
20	60	70	126	19,5	—	20	76	0,3	2	.020			●	●

- Multifunktionales Hochleistungswerkzeug
- Neuentwickelte Geometrie
- Vibrationsarme Bearbeitung
- Schneiden zur Mitte
- 3 Baulängen verfügbar

- Multi-functional, high performance tool
- Newly developed geometry
- Low-vibration machining
- Centre cutting
- 3 lengths available



**N**

**HM**

DIN 6535  
HA  
HB

3-5°

34-38°

KB x 45°

V<sub>c</sub>/f<sub>z</sub>  
20 - 21



Allround

Allround

Beschichtung · Coating

Einsatzgebiete – Material (siehe Seite 4)

- In fast allen Werkstoffen einsetzbar
- Zum Schruppen und Schlichten geeignet

Applications – material (see page 4)

- For almost all materials
- Suitable for roughing and finishing

TIALN

TIALN

P	1.1-5.1
M	1.1-4.1
K	1.1-4.2
N	1.1-1.4
N	2.1-2.8, 5.2 3.1-4.2
S	1.1 1.2-1.3
S	2.1 2.2-2.6
H	1.1-1.2 1.3

P	1.1-5.1
M	1.1-4.1
K	1.1-4.2
N	1.1-1.4
N	2.1-2.8, 5.2 3.1-4.2
S	1.1 1.2-1.3
S	2.1 2.2-2.6
H	1.1-1.2 1.3

### DIN 6527 – Kurze Ausführung · Short design

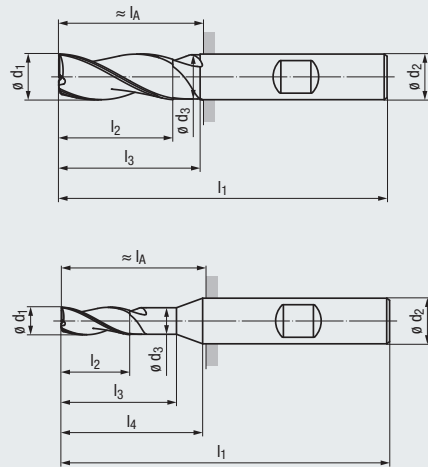
Bestell-Code · Order code											2516A	2517A		
$\varnothing d_1$ h10	$l_2$	$l_3$	$l_1$	$\varnothing d_3$	$l_4$	$\varnothing d_2$ h5	$l_A$ 	KB	Z (Flutes)	Dimens.-Code				
1,5	3	—	50	—	14	6	14	0,04	3	.0015	●	●		
2	3	5	50	1,9	14	6	14	0,04	3	.002	●	●		
2,5	3	5	50	2,4	14	6	14	0,07	3	.0025	●	●		
2,8	4	7	50	2,7	14	6	14	0,07	3	.0028	●	●		
3	4	7	50	2,9	14	6	14	0,07	3	.003	●	●		
3,5	4	7	50	3,3	14	6	14	0,07	3	.0035	●	●		
3,8	5	9	54	3,6	18	6	18	0,07	3	.0038	●	●		
4	5	9	54	3,8	18	6	18	0,07	3	.004	●	●		
4,5	5	9	54	4,3	18	6	18	0,12	3	.0045	●	●		
4,8	6	11	54	4,6	18	6	18	0,12	3	.0048	●	●		
5	6	11	54	4,8	18	6	18	0,12	3	.005	●	●		
5,5	7	12	54	5,3	18	6	18	0,12	3	.0055	●	●		
5,75	7	16	54	5,55	18	6	18	0,12	3	.00575	●	●		
6	7	16	54	5,8	—	6	18	0,12	3	.006	●	●		
7,75	9	18	58	7,45	20	8	22	0,12	3	.00775	●	●		
8	9	20	58	7,7	—	8	22	0,12	3	.008	●	●		
9,7	11	22	66	9,4	24	10	26	0,2	3	.0097	●	●		
10	11	24	66	9,5	—	10	26	0,2	3	.010	●	●		
11,7	12	24	73	11,2	26	12	28	0,2	3	.0117	●	●		
12	12	26	73	11,5	—	12	28	0,2	3	.012	●	●		
15,7	16	30	82	15,2	32	16	34	0,2	3	.0157	● new	● new		
16	16	32	82	15,5	—	16	34	0,2	3	.016	●	●		
20	20	40	92	19,5	—	20	42	0,3	3	.020	●	●		

### DIN 6527 – Lange Ausführung · Long design

Bestell-Code · Order code													2518A	2519A
$\varnothing d_1$ h10	$l_2$	$l_3$	$l_1$	$\varnothing d_3$	$l_4$	$\varnothing d_2$ h5	$l_A$ 	KB	Z (Flutes)	Dimens.-Code				
1	4	—	57	—	20	6	21	0,04	3	.00106			● new	●
2	6	8	57	1,9	20	6	21	0,04	3	.002			●	●
3	7	10	57	2,9	20	6	21	0,07	3	.003			●	●
4	8	12	57	3,8	20	6	21	0,07	3	.004			●	●
5	10	15	57	4,8	20	6	21	0,12	3	.005			●	●
6	10	20	57	5,8	—	6	21	0,12	3	.006			●	●
7	13	23	63	6,7	25	8	27	0,12	3	.007			●	●
8	16	25	63	7,7	—	8	27	0,12	3	.008			●	●
10	19	30	72	9,5	—	10	32	0,2	3	.010			●	●
12	22	35	83	11,5	—	12	38	0,2	3	.012			●	●
16	26	40	92	15,5	—	16	44	0,2	3	.016			●	●
20	32	50	104	19,5	—	20	54	0,3	3	.020			●	●

- Multifunktionales Hochleistungswerkzeug
- Neuentwickelte Geometrie
- Vibrationsarme Bearbeitung
- Schneiden zur Mitte
- Schneidenlänge 3 x d<sub>1</sub>
- 3 Baulängen verfügbar

- Multi-functional, high performance tool
- Newly developed geometry
- Low-vibration machining
- Centre cutting
- Flute length 3 x d<sub>1</sub>
- 3 lengths available



**N**

**HM**

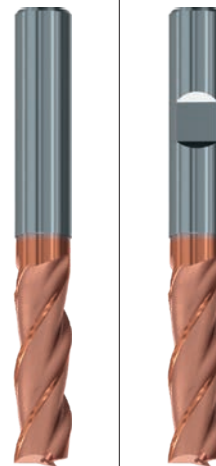
**DIN 6535**  
HA  
HB

**1-2°**

**34-38°**

**KB x 45°**

**V<sub>c</sub>/f<sub>z</sub>**  
22



Allround

**Beschichtung · Coating**

**Einsatzgebiete – Material (siehe Seite 4)**  
- In fast allen Werkstoffen einsetzbar  
- Zum Schruppen und Schlichten geeignet

**Applications – material (see page 4)**  
- For almost all materials  
- Suitable for roughing and finishing

**TIALN**

<b>P</b>	1.1-5.1
<b>M</b>	1.1-4.1
<b>K</b>	1.1-4.2
<b>N</b>	1.1-2.8, 5.2
<b>S</b>	1.1    1.2-1.3
<b>S</b>	2.1    2.2-2.6

**l<sub>2</sub> = 3 x d<sub>1</sub> – Extra lange Ausführung · Extra long design**

Bestell-Code · Order code											2520A	2521A		
∅ d <sub>1</sub> h10	l <sub>2</sub>	l <sub>3</sub>	l <sub>1</sub>	∅ d <sub>3</sub>	l <sub>4</sub>	∅ d <sub>2</sub> h5	l <sub>A</sub>	KB	Z (Flutes)	Dimens.- Code				
3	9	12	62	2,9	23	6	26	0,07	3	.003	●	●		
4	12	16	62	3,8	25	6	26	0,07	3	.004	●	●		
5	15	20	62	4,8	25	6	26	0,12	3	.005	●	●		
6	18	25	62	5,8	–	6	26	0,12	3	.006	●	●		
8	24	30	68	7,7	–	8	32	0,12	3	.008	●	●		
10	30	40	80	9,5	–	10	40	0,2	3	.010	●	●		
12	36	45	93	11,5	–	12	48	0,2	3	.012	●	●		
16	48	55	108	15,5	–	16	60	0,2	3	.016	●	●		
20	60	70	126	19,5	–	20	76	0,3	3	.020	●	●		



Universalfräser für den Werkzeug- und Formenbau mit ausführlichen Informationen erhalten Sie in unserem anwendungsbezogenen FRANKEN TOP-Cut-Prospekt.

Bestell-Nr. ZP20099.DEGB

Universal end mills for the die and mould industry with detailed information can be found in our application-based FRANKEN TOP-Cut brochure.

Order No. ZP20099.DEGB

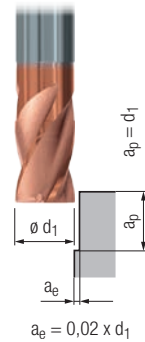
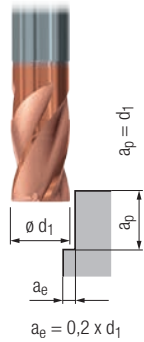
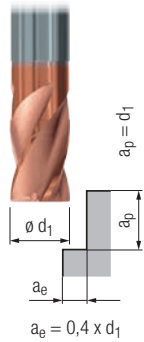
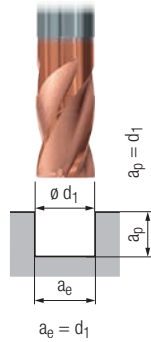


**Hartmetall-Schaft- und Langlochfräser – kurze Ausführung (2 - 4 Schneiden)**  
Solid carbide end mills and slot drills – short design (2 - 4 flutes)

**N**

Gültig für · Valid for

1916A 2510A 2516A  
1917A 2511A 2517A



		V <sub>c</sub> [m/min]		f <sub>z</sub> [mm]		V <sub>c</sub> [m/min]		f <sub>z</sub> [mm]				MMS	MLL	
<b>P</b>	1.1	170	0,005 x d <sub>1</sub>	190	0,006 x d <sub>1</sub>	200	0,007 x d <sub>1</sub>	240	0,008 x d <sub>1</sub>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	2.1	150	0,004 x d <sub>1</sub>	170	0,005 x d <sub>1</sub>	180	0,006 x d <sub>1</sub>	210	0,007 x d <sub>1</sub>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	3.1	130	0,004 x d <sub>1</sub>	140	0,005 x d <sub>1</sub>	160	0,005 x d <sub>1</sub>	180	0,006 x d <sub>1</sub>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	4.1	120	0,003 x d <sub>1</sub>	130	0,004 x d <sub>1</sub>	140	0,004 x d <sub>1</sub>	170	0,005 x d <sub>1</sub>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
	5.1	100	0,003 x d <sub>1</sub>	110	0,003 x d <sub>1</sub>	120	0,004 x d <sub>1</sub>	140	0,004 x d <sub>1</sub>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
<b>M</b>	1.1	80	0,003 x d <sub>1</sub>	90	0,004 x d <sub>1</sub>	100	0,004 x d <sub>1</sub>	110	0,005 x d <sub>1</sub>			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	2.1	70	0,003 x d <sub>1</sub>	80	0,004 x d <sub>1</sub>	80	0,004 x d <sub>1</sub>	100	0,005 x d <sub>1</sub>			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	3.1	50	0,002 x d <sub>1</sub>	60	0,003 x d <sub>1</sub>	60	0,003 x d <sub>1</sub>	70	0,004 x d <sub>1</sub>			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	4.1	30	0,002 x d <sub>1</sub>	30	0,003 x d <sub>1</sub>	40	0,003 x d <sub>1</sub>	40	0,004 x d <sub>1</sub>			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<b>K</b>	1.1	170	0,005 x d <sub>1</sub>	190	0,006 x d <sub>1</sub>	200	0,007 x d <sub>1</sub>	240	0,008 x d <sub>1</sub>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
	1.2	170	0,005 x d <sub>1</sub>	190	0,006 x d <sub>1</sub>	200	0,007 x d <sub>1</sub>	240	0,008 x d <sub>1</sub>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
	2.1	150	0,004 x d <sub>1</sub>	170	0,005 x d <sub>1</sub>	180	0,006 x d <sub>1</sub>	210	0,006 x d <sub>1</sub>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
	2.2	150	0,004 x d <sub>1</sub>	170	0,005 x d <sub>1</sub>	180	0,006 x d <sub>1</sub>	210	0,006 x d <sub>1</sub>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
	3.1	130	0,004 x d <sub>1</sub>	140	0,005 x d <sub>1</sub>	160	0,006 x d <sub>1</sub>	180	0,006 x d <sub>1</sub>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
	3.2	130	0,004 x d <sub>1</sub>	140	0,005 x d <sub>1</sub>	160	0,006 x d <sub>1</sub>	180	0,006 x d <sub>1</sub>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
	4.1	100	0,003 x d <sub>1</sub>	110	0,004 x d <sub>1</sub>	120	0,004 x d <sub>1</sub>	140	0,005 x d <sub>1</sub>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
	4.2	80	0,003 x d <sub>1</sub>	90	0,004 x d <sub>1</sub>	100	0,004 x d <sub>1</sub>	110	0,005 x d <sub>1</sub>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
<b>N</b>	1.1	220	0,009 x d <sub>1</sub>	250	0,010 x d <sub>1</sub>	280	0,011 x d <sub>1</sub>	300	0,013 x d <sub>1</sub>			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	1.2	220	0,008 x d <sub>1</sub>	250	0,009 x d <sub>1</sub>	280	0,010 x d <sub>1</sub>	300	0,011 x d <sub>1</sub>			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	1.3	220	0,007 x d <sub>1</sub>	250	0,008 x d <sub>1</sub>	280	0,009 x d <sub>1</sub>	300	0,010 x d <sub>1</sub>			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	1.4	200	0,008 x d <sub>1</sub>	250	0,009 x d <sub>1</sub>	280	0,010 x d <sub>1</sub>	300	0,011 x d <sub>1</sub>			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	1.5													
	1.6													
	2.1	150	0,005 x d <sub>1</sub>	170	0,006 x d <sub>1</sub>	180	0,007 x d <sub>1</sub>	210	0,008 x d <sub>1</sub>			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	2.2	150	0,005 x d <sub>1</sub>	170	0,006 x d <sub>1</sub>	180	0,007 x d <sub>1</sub>	210	0,008 x d <sub>1</sub>			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	2.3	150	0,005 x d <sub>1</sub>	170	0,006 x d <sub>1</sub>	180	0,007 x d <sub>1</sub>	210	0,008 x d <sub>1</sub>			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	2.4	130	0,004 x d <sub>1</sub>	140	0,005 x d <sub>1</sub>	160	0,006 x d <sub>1</sub>	180	0,006 x d <sub>1</sub>			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	2.5	130	0,004 x d <sub>1</sub>	140	0,005 x d <sub>1</sub>	160	0,006 x d <sub>1</sub>	180	0,006 x d <sub>1</sub>			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	2.6	130	0,004 x d <sub>1</sub>	140	0,005 x d <sub>1</sub>	160	0,006 x d <sub>1</sub>	180	0,006 x d <sub>1</sub>			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	2.7	80	0,003 x d <sub>1</sub>	90	0,004 x d <sub>1</sub>	100	0,004 x d <sub>1</sub>	110	0,005 x d <sub>1</sub>			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	2.8	80	0,003 x d <sub>1</sub>	90	0,004 x d <sub>1</sub>	100	0,004 x d <sub>1</sub>	110	0,005 x d <sub>1</sub>			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	3.1	340	0,009 x d <sub>1</sub>	370	0,011 x d <sub>1</sub>	410	0,013 x d <sub>1</sub>	480	0,014 x d <sub>1</sub>			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	3.2	340	0,007 x d <sub>1</sub>	370	0,008 x d <sub>1</sub>	410	0,010 x d <sub>1</sub>	480	0,011 x d <sub>1</sub>			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
4.1	340	0,008 x d <sub>1</sub>	370	0,009 x d <sub>1</sub>	410	0,011 x d <sub>1</sub>	480	0,012 x d <sub>1</sub>			<input type="checkbox"/>	<input checked="" type="checkbox"/>		
4.2	500	0,008 x d <sub>1</sub>	550	0,009 x d <sub>1</sub>	600	0,011 x d <sub>1</sub>	700	0,012 x d <sub>1</sub>			<input type="checkbox"/>	<input checked="" type="checkbox"/>		
4.3														
4.4														
5.1														
5.2	80	0,003 x d <sub>1</sub>	90	0,004 x d <sub>1</sub>	100	0,004 x d <sub>1</sub>	110	0,005 x d <sub>1</sub>					<input checked="" type="checkbox"/>	
5.3														
<b>S</b>	1.1	80	0,004 x d <sub>1</sub>	90	0,004 x d <sub>1</sub>	100	0,005 x d <sub>1</sub>	110	0,006 x d <sub>1</sub>					<input checked="" type="checkbox"/>
	1.2	70	0,003 x d <sub>1</sub>	80	0,004 x d <sub>1</sub>	80	0,004 x d <sub>1</sub>	100	0,005 x d <sub>1</sub>					<input checked="" type="checkbox"/>
	1.3	40	0,003 x d <sub>1</sub>	40	0,003 x d <sub>1</sub>	50	0,004 x d <sub>1</sub>	60	0,004 x d <sub>1</sub>					<input checked="" type="checkbox"/>
	2.1	70	0,002 x d <sub>1</sub>	80	0,002 x d <sub>1</sub>	80	0,003 x d <sub>1</sub>	100	0,003 x d <sub>1</sub>					<input checked="" type="checkbox"/>
	2.2	30	0,002 x d <sub>1</sub>	30	0,002 x d <sub>1</sub>	35	0,003 x d <sub>1</sub>	40	0,003 x d <sub>1</sub>					<input checked="" type="checkbox"/>
	2.3	20	0,002 x d <sub>1</sub>	25	0,002 x d <sub>1</sub>	25	0,003 x d <sub>1</sub>	30	0,003 x d <sub>1</sub>					<input checked="" type="checkbox"/>
2.4	20	0,002 x d <sub>1</sub>	25	0,002 x d <sub>1</sub>	25	0,003 x d <sub>1</sub>	30	0,003 x d <sub>1</sub>					<input checked="" type="checkbox"/>	
2.5	20	0,002 x d <sub>1</sub>	20	0,002 x d <sub>1</sub>	20	0,003 x d <sub>1</sub>	30	0,003 x d <sub>1</sub>					<input checked="" type="checkbox"/>	
2.6	20	0,002 x d <sub>1</sub>	20	0,002 x d <sub>1</sub>	20	0,003 x d <sub>1</sub>	30	0,003 x d <sub>1</sub>					<input checked="" type="checkbox"/>	
<b>H</b>	1.1	100	0,003 x d <sub>1</sub>	110	0,003 x d <sub>1</sub>	120	0,004 x d <sub>1</sub>	140	0,004 x d <sub>1</sub>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
	1.2	80	0,003 x d <sub>1</sub>	90	0,003 x d <sub>1</sub>	100	0,004 x d <sub>1</sub>	110	0,004 x d <sub>1</sub>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
	1.3			90	0,003 x d <sub>1</sub>	100	0,003 x d <sub>1</sub>	110	0,004 x d <sub>1</sub>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
	1.4													
	1.5													

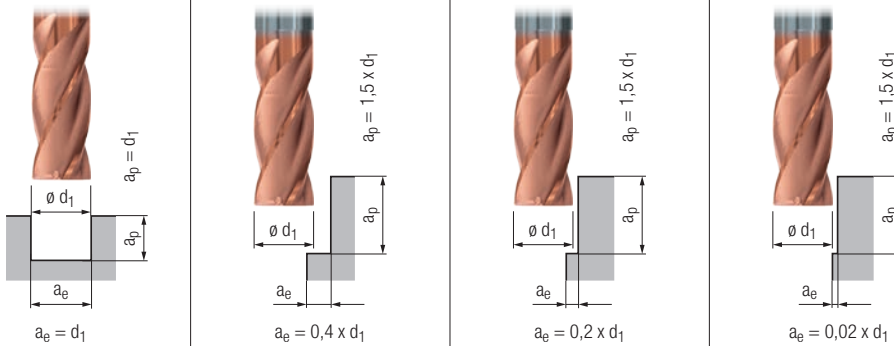


**Hartmetall-Schaftfräser – lange Ausführung (2 - 8 Schneiden)**  
Solid carbide end mills – long design (2 - 8 flutes)

**N**

Gültig für · Valid for

- 1998A 2513A 2698A
- 1998AZ 2518A 2698AZ
- 1999A 2519A 2699A
- 1999AZ 2522A 1) 2699AZ
- 2512A 2523A 1)



		V <sub>c</sub> [m/min]	f <sub>z</sub> [mm]	V <sub>c</sub> [m/min]	f <sub>z</sub> [mm]	V <sub>c</sub> [m/min]	f <sub>z</sub> [mm]	V <sub>c</sub> [m/min]	f <sub>z</sub> [mm]				
												MMS MQL	
<b>P</b>	1.1	140	0,005 x d <sub>1</sub>	150	0,005 x d <sub>1</sub>	170	0,006 x d <sub>1</sub>	200	0,007 x d <sub>1</sub>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	130	0,004 x d <sub>1</sub>	140	0,005 x d <sub>1</sub>	160	0,005 x d <sub>1</sub>	180	0,006 x d <sub>1</sub>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	110	0,004 x d <sub>1</sub>	120	0,004 x d <sub>1</sub>	130	0,005 x d <sub>1</sub>	150	0,005 x d <sub>1</sub>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	4.1	100	0,003 x d <sub>1</sub>	110	0,003 x d <sub>1</sub>	120	0,004 x d <sub>1</sub>	140	0,004 x d <sub>1</sub>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	5.1	90	0,003 x d <sub>1</sub>	100	0,003 x d <sub>1</sub>	110	0,003 x d <sub>1</sub>	130	0,004 x d <sub>1</sub>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
<b>M</b>	1.1	70	0,003 x d <sub>1</sub>	80	0,003 x d <sub>1</sub>	80	0,004 x d <sub>1</sub>	100	0,004 x d <sub>1</sub>			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	60	0,003 x d <sub>1</sub>	70	0,003 x d <sub>1</sub>	70	0,004 x d <sub>1</sub>	80	0,004 x d <sub>1</sub>			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	40	0,002 x d <sub>1</sub>	40	0,003 x d <sub>1</sub>	50	0,003 x d <sub>1</sub>	60	0,003 x d <sub>1</sub>			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	4.1	30	0,002 x d <sub>1</sub>	30	0,003 x d <sub>1</sub>	40	0,003 x d <sub>1</sub>	40	0,003 x d <sub>1</sub>			<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>K</b>	1.1	140	0,005 x d <sub>1</sub>	150	0,006 x d <sub>1</sub>	170	0,006 x d <sub>1</sub>	200	0,007 x d <sub>1</sub>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	1.2	140	0,005 x d <sub>1</sub>	150	0,006 x d <sub>1</sub>	170	0,006 x d <sub>1</sub>	200	0,007 x d <sub>1</sub>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	2.1	130	0,004 x d <sub>1</sub>	140	0,005 x d <sub>1</sub>	160	0,005 x d <sub>1</sub>	180	0,006 x d <sub>1</sub>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	2.2	130	0,004 x d <sub>1</sub>	140	0,005 x d <sub>1</sub>	160	0,005 x d <sub>1</sub>	180	0,006 x d <sub>1</sub>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	3.1	110	0,004 x d <sub>1</sub>	120	0,005 x d <sub>1</sub>	130	0,005 x d <sub>1</sub>	150	0,006 x d <sub>1</sub>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	3.2	110	0,004 x d <sub>1</sub>	120	0,005 x d <sub>1</sub>	130	0,005 x d <sub>1</sub>	150	0,006 x d <sub>1</sub>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	4.1	90	0,003 x d <sub>1</sub>	100	0,003 x d <sub>1</sub>	110	0,004 x d <sub>1</sub>	130	0,004 x d <sub>1</sub>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	4.2	70	0,003 x d <sub>1</sub>	80	0,003 x d <sub>1</sub>	80	0,004 x d <sub>1</sub>	100	0,004 x d <sub>1</sub>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
<b>N</b>	1.1	220	0,009 x d <sub>1</sub>	250	0,010 x d <sub>1</sub>	280	0,011 x d <sub>1</sub>	300	0,013 x d <sub>1</sub>			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.2	220	0,008 x d <sub>1</sub>	250	0,009 x d <sub>1</sub>	280	0,010 x d <sub>1</sub>	300	0,011 x d <sub>1</sub>			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.3	220	0,007 x d <sub>1</sub>	250	0,008 x d <sub>1</sub>	280	0,009 x d <sub>1</sub>	300	0,010 x d <sub>1</sub>			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.4	200	0,008 x d <sub>1</sub>	250	0,009 x d <sub>1</sub>	280	0,010 x d <sub>1</sub>	300	0,011 x d <sub>1</sub>			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.5												
	1.6												
	2.1	130	0,005 x d <sub>1</sub>	140	0,006 x d <sub>1</sub>	160	0,006 x d <sub>1</sub>	180	0,007 x d <sub>1</sub>			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.2	130	0,005 x d <sub>1</sub>	140	0,006 x d <sub>1</sub>	160	0,006 x d <sub>1</sub>	180	0,007 x d <sub>1</sub>			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.3	130	0,005 x d <sub>1</sub>	140	0,006 x d <sub>1</sub>	160	0,006 x d <sub>1</sub>	180	0,007 x d <sub>1</sub>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.4	120	0,004 x d <sub>1</sub>	130	0,005 x d <sub>1</sub>	140	0,005 x d <sub>1</sub>	170	0,006 x d <sub>1</sub>			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.5	120	0,004 x d <sub>1</sub>	130	0,005 x d <sub>1</sub>	140	0,005 x d <sub>1</sub>	170	0,006 x d <sub>1</sub>			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.6	120	0,004 x d <sub>1</sub>	130	0,005 x d <sub>1</sub>	140	0,005 x d <sub>1</sub>	170	0,006 x d <sub>1</sub>			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.7	70	0,003 x d <sub>1</sub>	80	0,003 x d <sub>1</sub>	80	0,004 x d <sub>1</sub>	100	0,004 x d <sub>1</sub>			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.8	70	0,003 x d <sub>1</sub>	80	0,003 x d <sub>1</sub>	80	0,004 x d <sub>1</sub>	100	0,004 x d <sub>1</sub>			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	290	0,009 x d <sub>1</sub>	320	0,010 x d <sub>1</sub>	350	0,011 x d <sub>1</sub>	410	0,013 x d <sub>1</sub>			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.2	290	0,007 x d <sub>1</sub>	320	0,008 x d <sub>1</sub>	350	0,009 x d <sub>1</sub>	410	0,010 x d <sub>1</sub>			<input type="checkbox"/>	<input checked="" type="checkbox"/>
4.1	290	0,008 x d <sub>1</sub>	320	0,009 x d <sub>1</sub>	350	0,009 x d <sub>1</sub>	410	0,011 x d <sub>1</sub>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
4.2	430	0,008 x d <sub>1</sub>	470	0,009 x d <sub>1</sub>	520	0,009 x d <sub>1</sub>	600	0,011 x d <sub>1</sub>			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
4.3													
4.4													
5.1													
5.2	70	0,003 x d <sub>1</sub>	80	0,003 x d <sub>1</sub>	80	0,004 x d <sub>1</sub>	100	0,004 x d <sub>1</sub>				<input checked="" type="checkbox"/>	
5.3													
<b>S</b>	1.1	70	0,004 x d <sub>1</sub>	80	0,004 x d <sub>1</sub>	80	0,004 x d <sub>1</sub>	100	0,005 x d <sub>1</sub>				<input checked="" type="checkbox"/>
	1.2	60	0,003 x d <sub>1</sub>	70	0,003 x d <sub>1</sub>	70	0,004 x d <sub>1</sub>	80	0,004 x d <sub>1</sub>				<input checked="" type="checkbox"/>
	1.3	40	0,003 x d <sub>1</sub>	40	0,003 x d <sub>1</sub>	50	0,003 x d <sub>1</sub>	60	0,004 x d <sub>1</sub>				<input checked="" type="checkbox"/>
	2.1	60	0,002 x d <sub>1</sub>	70	0,002 x d <sub>1</sub>	70	0,003 x d <sub>1</sub>	80	0,003 x d <sub>1</sub>				<input checked="" type="checkbox"/>
	2.2	20	0,002 x d <sub>1</sub>	20	0,002 x d <sub>1</sub>	15	0,003 x d <sub>1</sub>	30	0,003 x d <sub>1</sub>				<input checked="" type="checkbox"/>
	2.3	20	0,002 x d <sub>1</sub>	25	0,002 x d <sub>1</sub>	25	0,003 x d <sub>1</sub>	30	0,003 x d <sub>1</sub>				<input checked="" type="checkbox"/>
	2.4	20	0,002 x d <sub>1</sub>	25	0,002 x d <sub>1</sub>	25	0,003 x d <sub>1</sub>	30	0,003 x d <sub>1</sub>				<input checked="" type="checkbox"/>
2.5	20	0,002 x d <sub>1</sub>	20	0,002 x d <sub>1</sub>	20	0,003 x d <sub>1</sub>	30	0,003 x d <sub>1</sub>				<input checked="" type="checkbox"/>	
2.6	20	0,002 x d <sub>1</sub>	20	0,002 x d <sub>1</sub>	20	0,003 x d <sub>1</sub>	30	0,003 x d <sub>1</sub>				<input checked="" type="checkbox"/>	
<b>H</b>	1.1	90	0,003 x d <sub>1</sub>	100	0,003 x d <sub>1</sub>	110	0,003 x d <sub>1</sub>	130	0,004 x d <sub>1</sub>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	1.2	70	0,003 x d <sub>1</sub>	80	0,003 x d <sub>1</sub>	80	0,003 x d <sub>1</sub>	100	0,004 x d <sub>1</sub>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	1.3			70	0,003 x d <sub>1</sub>	70	0,003 x d <sub>1</sub>	80	0,003 x d <sub>1</sub>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	1.4												
	1.5												

■ = sehr gut geeignet · very suitable  
□ = gut geeignet · suitable

1) Für die Vollturbearbeitung nicht geeignet!  
Not suitable for full slot milling!

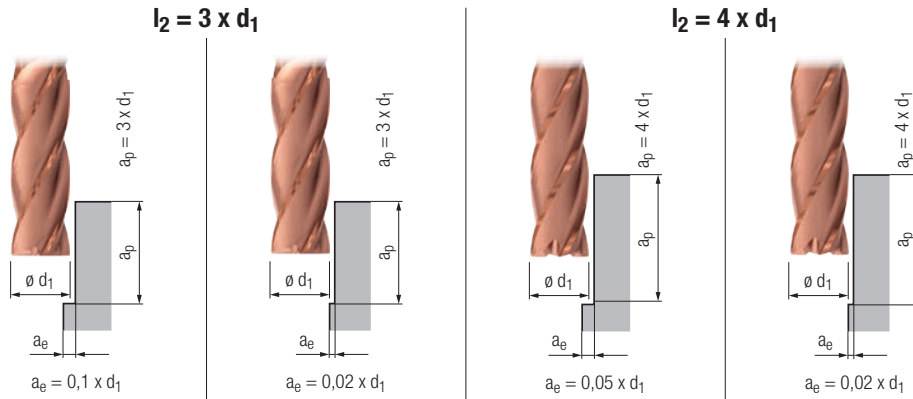


**Hartmetall-Schafffräser – extra lange Ausführung (2 - 8 Schneiden)**  
Solid carbide end mills – extra long design (2 - 8 flutes)

**N**

Gültig für · Valid for

- 2514A 2524A 2528A
- 2515A 2525A 2529A
- 2520A 2526A
- 2521A 2527A



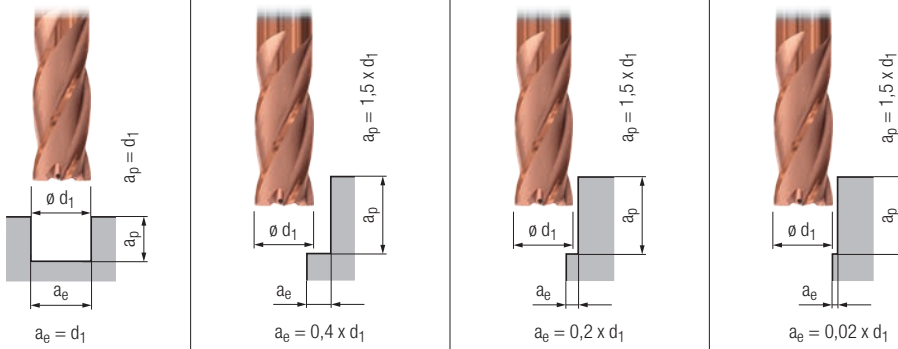
		$l_2 = 3 \times d_1$		$l_2 = 4 \times d_1$				MMS MQL					
		$v_c$ [m/min]	$f_z$ [mm]	$v_c$ [m/min]	$f_z$ [mm]					$v_c$ [m/min]	$f_z$ [mm]		
<b>P</b>	1.1	120	$0,005 \times d_1$	140	$0,006 \times d_1$	100	$0,005 \times d_1$	120	$0,005 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	110	$0,004 \times d_1$	130	$0,005 \times d_1$	90	$0,004 \times d_1$	110	$0,005 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	90	$0,004 \times d_1$	110	$0,005 \times d_1$	70	$0,004 \times d_1$	90	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	4.1	70	$0,003 \times d_1$	80	$0,004 \times d_1$	60	$0,003 \times d_1$	70	$0,003 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	5.1	60	$0,003 \times d_1$	70	$0,003 \times d_1$	50	$0,003 \times d_1$	60	$0,003 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>M</b>	1.1	120	$0,003 \times d_1$	140	$0,004 \times d_1$	100	$0,003 \times d_1$	120	$0,003 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	100	$0,003 \times d_1$	120	$0,004 \times d_1$	80	$0,003 \times d_1$	100	$0,003 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	70	$0,003 \times d_1$	80	$0,003 \times d_1$	60	$0,003 \times d_1$	70	$0,003 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	4.1	50	$0,003 \times d_1$	60	$0,003 \times d_1$	40	$0,003 \times d_1$	50	$0,003 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>K</b>	1.1	120	$0,005 \times d_1$	140	$0,006 \times d_1$	100	$0,005 \times d_1$	120	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.2	120	$0,005 \times d_1$	140	$0,006 \times d_1$	100	$0,005 \times d_1$	120	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	110	$0,004 \times d_1$	130	$0,005 \times d_1$	90	$0,004 \times d_1$	110	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.2	110	$0,004 \times d_1$	130	$0,005 \times d_1$	90	$0,004 \times d_1$	110	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	90	$0,004 \times d_1$	110	$0,005 \times d_1$	70	$0,004 \times d_1$	90	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.2	90	$0,004 \times d_1$	110	$0,005 \times d_1$	70	$0,004 \times d_1$	90	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	4.1	70	$0,003 \times d_1$	80	$0,004 \times d_1$	60	$0,003 \times d_1$	70	$0,003 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	4.2	60	$0,003 \times d_1$	70	$0,004 \times d_1$	50	$0,003 \times d_1$	60	$0,003 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>N</b>	1.1	360	$0,009 \times d_1$	430	$0,011 \times d_1$	300	$0,009 \times d_1$	430	$0,009 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.2	360	$0,008 \times d_1$	430	$0,010 \times d_1$	300	$0,008 \times d_1$	430	$0,009 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.3	360	$0,007 \times d_1$	430	$0,008 \times d_1$	300	$0,007 \times d_1$	430	$0,008 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.4	240	$0,008 \times d_1$	290	$0,010 \times d_1$	200	$0,008 \times d_1$	290	$0,009 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.5	230	$0,007 \times d_1$	280	$0,008 \times d_1$	180	$0,007 \times d_1$	280	$0,008 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.6	160	$0,006 \times d_1$	190	$0,007 \times d_1$	130	$0,006 \times d_1$	190	$0,007 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	110	$0,005 \times d_1$	130	$0,006 \times d_1$	90	$0,005 \times d_1$	110	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.2	110	$0,005 \times d_1$	130	$0,006 \times d_1$	90	$0,005 \times d_1$	110	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.3	110	$0,005 \times d_1$	130	$0,006 \times d_1$	90	$0,005 \times d_1$	110	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.4	100	$0,004 \times d_1$	120	$0,005 \times d_1$	80	$0,004 \times d_1$	100	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.5	100	$0,004 \times d_1$	120	$0,005 \times d_1$	80	$0,004 \times d_1$	100	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.6	100	$0,004 \times d_1$	120	$0,005 \times d_1$	80	$0,004 \times d_1$	100	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.7	60	$0,003 \times d_1$	70	$0,004 \times d_1$	50	$0,003 \times d_1$	60	$0,003 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.8	60	$0,003 \times d_1$	70	$0,004 \times d_1$	50	$0,003 \times d_1$	60	$0,003 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1												
	3.2												
4.1													
4.2													
4.3													
4.4													
5.1													
5.2	60	$0,003 \times d_1$	70	$0,004 \times d_1$	50	$0,003 \times d_1$	60	$0,003 \times d_1$				<input checked="" type="checkbox"/>	
5.3													
<b>S</b>	1.1	90	$0,004 \times d_1$	100	$0,005 \times d_1$	70	$0,004 \times d_1$	80	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.2	70	$0,003 \times d_1$	80	$0,004 \times d_1$	60	$0,003 \times d_1$	70	$0,003 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.3	70	$0,003 \times d_1$	80	$0,003 \times d_1$	60	$0,003 \times d_1$	70	$0,003 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	70	$0,004 \times d_1$	80	$0,004 \times d_1$	60	$0,004 \times d_1$	70	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.2	30	$0,003 \times d_1$	40	$0,004 \times d_1$	15	$0,003 \times d_1$	30	$0,003 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.3	20	$0,002 \times d_1$	25	$0,002 \times d_1$	25	$0,002 \times d_1$	20	$0,002 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.4	30	$0,003 \times d_1$	45	$0,003 \times d_1$	25	$0,003 \times d_1$	30	$0,003 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2.5	20	$0,002 \times d_1$	20	$0,002 \times d_1$	20	$0,002 \times d_1$	20	$0,002 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
2.6	20	$0,003 \times d_1$	20	$0,003 \times d_1$	20	$0,003 \times d_1$	20	$0,003 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<b>H</b>	1.1												
	1.2												
	1.3												
	1.4												
	1.5												



**Hartmetall-Schafffräser – extra lange Ausführung (4 Schneiden)**  
Solid carbide end mills – extra long design (4 flutes)

**N**

Gültig für · Valid for  
3806AZ  
3807AZ



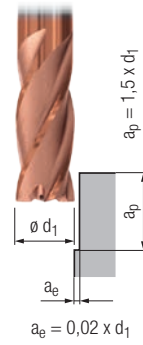
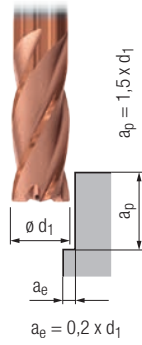
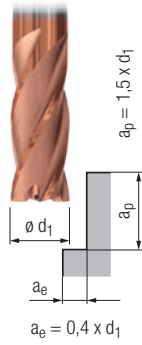
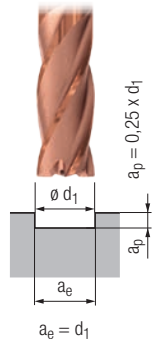
		$V_c$	$f_z$	$V_c$	$f_z$	$V_c$	$f_z$	$V_c$	$f_z$				
		[m/min]	[mm]	[m/min]	[mm]	[m/min]	[mm]	[m/min]	[mm]				
<b>P</b>	1.1	120	$0,005 \times d_1$	140	$0,005 \times d_1$	160	$0,006 \times d_1$	180	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	110	$0,004 \times d_1$	130	$0,005 \times d_1$	150	$0,005 \times d_1$	170	$0,005 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	100	$0,004 \times d_1$	120	$0,004 \times d_1$	140	$0,005 \times d_1$	160	$0,005 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	4.1	80	$0,003 \times d_1$	100	$0,003 \times d_1$	120	$0,004 \times d_1$	140	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	5.1	70	$0,003 \times d_1$	90	$0,003 \times d_1$	110	$0,003 \times d_1$	130	$0,003 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
<b>M</b>	1.1	70	$0,003 \times d_1$	80	$0,003 \times d_1$	80	$0,004 \times d_1$	100	$0,004 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	60	$0,003 \times d_1$	70	$0,003 \times d_1$	70	$0,004 \times d_1$	80	$0,004 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	40	$0,002 \times d_1$	40	$0,003 \times d_1$	50	$0,003 \times d_1$	60	$0,003 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	4.1	30	$0,002 \times d_1$	30	$0,003 \times d_1$	40	$0,003 \times d_1$	40	$0,003 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>K</b>	1.1	120	$0,005 \times d_1$	140	$0,006 \times d_1$	160	$0,006 \times d_1$	180	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	1.2	120	$0,005 \times d_1$	140	$0,006 \times d_1$	160	$0,006 \times d_1$	180	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	2.1	110	$0,004 \times d_1$	130	$0,005 \times d_1$	150	$0,005 \times d_1$	170	$0,005 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	2.2	110	$0,004 \times d_1$	130	$0,005 \times d_1$	150	$0,005 \times d_1$	170	$0,005 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	3.1	100	$0,004 \times d_1$	110	$0,005 \times d_1$	130	$0,005 \times d_1$	150	$0,005 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	3.2	100	$0,004 \times d_1$	110	$0,005 \times d_1$	130	$0,005 \times d_1$	150	$0,005 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	4.1	90	$0,003 \times d_1$	100	$0,003 \times d_1$	110	$0,004 \times d_1$	130	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	4.2	70	$0,003 \times d_1$	80	$0,003 \times d_1$	90	$0,004 \times d_1$	100	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
<b>N</b>	1.1	200	$0,009 \times d_1$	220	$0,010 \times d_1$	240	$0,011 \times d_1$	260	$0,013 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.2	200	$0,008 \times d_1$	220	$0,009 \times d_1$	240	$0,010 \times d_1$	260	$0,011 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.3	200	$0,007 \times d_1$	220	$0,008 \times d_1$	240	$0,009 \times d_1$	260	$0,010 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.4	180	$0,008 \times d_1$	220	$0,009 \times d_1$	240	$0,010 \times d_1$	260	$0,011 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.5											<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.6											<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	120	$0,005 \times d_1$	130	$0,006 \times d_1$	150	$0,006 \times d_1$	170	$0,007 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.2	120	$0,005 \times d_1$	130	$0,006 \times d_1$	150	$0,006 \times d_1$	170	$0,007 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.3	120	$0,005 \times d_1$	130	$0,006 \times d_1$	150	$0,006 \times d_1$	170	$0,007 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.4	110	$0,004 \times d_1$	120	$0,005 \times d_1$	140	$0,005 \times d_1$	160	$0,006 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.5	110	$0,004 \times d_1$	120	$0,005 \times d_1$	140	$0,005 \times d_1$	160	$0,006 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.6	110	$0,004 \times d_1$	120	$0,005 \times d_1$	140	$0,005 \times d_1$	160	$0,006 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.7	70	$0,003 \times d_1$	80	$0,003 \times d_1$	80	$0,004 \times d_1$	100	$0,004 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.8	70	$0,003 \times d_1$	80	$0,003 \times d_1$	80	$0,004 \times d_1$	100	$0,004 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	280	$0,009 \times d_1$	300	$0,010 \times d_1$	320	$0,011 \times d_1$	350	$0,013 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.2	280	$0,007 \times d_1$	300	$0,008 \times d_1$	320	$0,009 \times d_1$	350	$0,010 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
4.1	280	$0,008 \times d_1$	300	$0,009 \times d_1$	320	$0,009 \times d_1$	350	$0,011 \times d_1$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
4.2	420	$0,008 \times d_1$	450	$0,009 \times d_1$	480	$0,009 \times d_1$	520	$0,011 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
4.3											<input type="checkbox"/>	<input checked="" type="checkbox"/>	
4.4											<input type="checkbox"/>	<input checked="" type="checkbox"/>	
5.1											<input type="checkbox"/>	<input checked="" type="checkbox"/>	
5.2	70	$0,003 \times d_1$	80	$0,003 \times d_1$	80	$0,004 \times d_1$	90	$0,004 \times d_1$				<input checked="" type="checkbox"/>	
5.3												<input checked="" type="checkbox"/>	
<b>S</b>	1.1	70	$0,004 \times d_1$	80	$0,004 \times d_1$	80	$0,004 \times d_1$	80	$0,005 \times d_1$				<input checked="" type="checkbox"/>
	1.2	60	$0,003 \times d_1$	70	$0,003 \times d_1$	70	$0,004 \times d_1$	70	$0,004 \times d_1$				<input checked="" type="checkbox"/>
	1.3	40	$0,003 \times d_1$	40	$0,003 \times d_1$	50	$0,003 \times d_1$	50	$0,004 \times d_1$				<input checked="" type="checkbox"/>
	2.1	60	$0,002 \times d_1$	70	$0,002 \times d_1$	70	$0,003 \times d_1$	70	$0,003 \times d_1$				<input checked="" type="checkbox"/>
	2.2	20	$0,002 \times d_1$	20	$0,002 \times d_1$	25	$0,003 \times d_1$	30	$0,003 \times d_1$				<input checked="" type="checkbox"/>
	2.3	20	$0,002 \times d_1$	25	$0,002 \times d_1$	25	$0,003 \times d_1$	30	$0,003 \times d_1$				<input checked="" type="checkbox"/>
	2.4	20	$0,002 \times d_1$	25	$0,002 \times d_1$	25	$0,003 \times d_1$	30	$0,003 \times d_1$				<input checked="" type="checkbox"/>
2.5	20	$0,002 \times d_1$	20	$0,002 \times d_1$	25	$0,003 \times d_1$	30	$0,003 \times d_1$				<input checked="" type="checkbox"/>	
2.6	20	$0,002 \times d_1$	20	$0,002 \times d_1$	25	$0,003 \times d_1$	30	$0,003 \times d_1$				<input checked="" type="checkbox"/>	
<b>H</b>	1.1	80	$0,003 \times d_1$	90	$0,003 \times d_1$	100	$0,003 \times d_1$	110	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	1.2	70	$0,003 \times d_1$	80	$0,003 \times d_1$	80	$0,003 \times d_1$	90	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	1.3												
	1.4												
	1.5												

■ = sehr gut geeignet · very suitable  
□ = gut geeignet · suitable

**Hartmetall-Schafffräser – extra lange Ausführung (4 Schneiden)**  
Solid carbide end mills – extra long design (4 flutes)

**N**

$l_3 = 6 \times d_1$



Gültig für · Valid for

3808AZ  
3809AZ

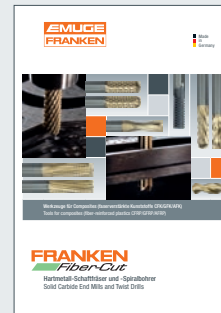
		$V_c$	$f_z$	$V_c$	$f_z$	$V_c$	$f_z$	$V_c$	$f_z$			MMS	
		[m/min]	[mm]	[m/min]	[mm]	[m/min]	[mm]	[m/min]	[mm]				
<b>P</b>	1.1	80	$0,005 \times d_1$	120	$0,005 \times d_1$	140	$0,006 \times d_1$	160	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	70	$0,004 \times d_1$	110	$0,005 \times d_1$	130	$0,005 \times d_1$	150	$0,005 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	60	$0,004 \times d_1$	100	$0,004 \times d_1$	120	$0,005 \times d_1$	140	$0,005 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	4.1	60	$0,003 \times d_1$	80	$0,003 \times d_1$	100	$0,004 \times d_1$	120	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	5.1	50	$0,003 \times d_1$	80	$0,003 \times d_1$	90	$0,003 \times d_1$	110	$0,003 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
<b>M</b>	1.1	70	$0,003 \times d_1$	70	$0,003 \times d_1$	80	$0,004 \times d_1$	100	$0,004 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.1	60	$0,003 \times d_1$	60	$0,003 \times d_1$	70	$0,004 \times d_1$	80	$0,004 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	40	$0,002 \times d_1$	40	$0,003 \times d_1$	50	$0,003 \times d_1$	60	$0,003 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	4.1	30	$0,002 \times d_1$	30	$0,003 \times d_1$	40	$0,003 \times d_1$	40	$0,003 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>K</b>	1.1	80	$0,005 \times d_1$	120	$0,006 \times d_1$	140	$0,006 \times d_1$	160	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	1.2	80	$0,005 \times d_1$	120	$0,006 \times d_1$	140	$0,006 \times d_1$	160	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	2.1	70	$0,004 \times d_1$	110	$0,005 \times d_1$	130	$0,005 \times d_1$	150	$0,005 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	2.2	70	$0,004 \times d_1$	110	$0,005 \times d_1$	130	$0,005 \times d_1$	150	$0,005 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	3.1	70	$0,004 \times d_1$	100	$0,005 \times d_1$	110	$0,005 \times d_1$	130	$0,005 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	3.2	70	$0,004 \times d_1$	100	$0,005 \times d_1$	110	$0,005 \times d_1$	130	$0,005 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	4.1	60	$0,003 \times d_1$	90	$0,003 \times d_1$	100	$0,004 \times d_1$	110	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	4.2	60	$0,003 \times d_1$	80	$0,003 \times d_1$	90	$0,004 \times d_1$	100	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
<b>N</b>	1.1	160	$0,009 \times d_1$	180	$0,010 \times d_1$	200	$0,011 \times d_1$	220	$0,013 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.2	160	$0,008 \times d_1$	180	$0,009 \times d_1$	200	$0,010 \times d_1$	220	$0,011 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.3	160	$0,007 \times d_1$	180	$0,008 \times d_1$	200	$0,009 \times d_1$	220	$0,010 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.4	140	$0,008 \times d_1$	180	$0,009 \times d_1$	200	$0,010 \times d_1$	220	$0,011 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	1.5												
	1.6												
	2.1	100	$0,005 \times d_1$	110	$0,006 \times d_1$	130	$0,006 \times d_1$	150	$0,007 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.2	100	$0,005 \times d_1$	110	$0,006 \times d_1$	130	$0,006 \times d_1$	150	$0,007 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.3	100	$0,005 \times d_1$	110	$0,006 \times d_1$	130	$0,006 \times d_1$	150	$0,007 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	2.4	90	$0,004 \times d_1$	100	$0,005 \times d_1$	120	$0,005 \times d_1$	140	$0,006 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.5	90	$0,004 \times d_1$	100	$0,005 \times d_1$	120	$0,005 \times d_1$	140	$0,006 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.6	90	$0,004 \times d_1$	100	$0,005 \times d_1$	120	$0,005 \times d_1$	140	$0,006 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	2.7	70	$0,003 \times d_1$	80	$0,003 \times d_1$	80	$0,004 \times d_1$	100	$0,004 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	2.8	70	$0,003 \times d_1$	80	$0,003 \times d_1$	80	$0,004 \times d_1$	100	$0,004 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.1	240	$0,009 \times d_1$	260	$0,010 \times d_1$	280	$0,011 \times d_1$	300	$0,013 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
	3.2	240	$0,007 \times d_1$	260	$0,008 \times d_1$	280	$0,009 \times d_1$	300	$0,010 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>
4.1	240	$0,008 \times d_1$	260	$0,009 \times d_1$	280	$0,009 \times d_1$	300	$0,011 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>			
4.2	380	$0,008 \times d_1$	400	$0,009 \times d_1$	420	$0,009 \times d_1$	450	$0,011 \times d_1$			<input type="checkbox"/>	<input checked="" type="checkbox"/>	
4.3													
4.4													
5.1													
5.2	70	$0,003 \times d_1$	80	$0,003 \times d_1$	80	$0,004 \times d_1$	90	$0,004 \times d_1$				<input checked="" type="checkbox"/>	
5.3													
<b>S</b>	1.1	60	$0,004 \times d_1$	70	$0,004 \times d_1$	80	$0,004 \times d_1$	80	$0,005 \times d_1$				<input checked="" type="checkbox"/>
	1.2	50	$0,003 \times d_1$	60	$0,003 \times d_1$	70	$0,004 \times d_1$	70	$0,004 \times d_1$				<input checked="" type="checkbox"/>
	1.3	40	$0,003 \times d_1$	40	$0,003 \times d_1$	50	$0,003 \times d_1$	50	$0,004 \times d_1$				<input checked="" type="checkbox"/>
	2.1	50	$0,002 \times d_1$	60	$0,002 \times d_1$	70	$0,003 \times d_1$	70	$0,003 \times d_1$				<input checked="" type="checkbox"/>
	2.2	20	$0,002 \times d_1$	20	$0,002 \times d_1$	25	$0,003 \times d_1$	30	$0,003 \times d_1$				<input checked="" type="checkbox"/>
	2.3	20	$0,002 \times d_1$	25	$0,002 \times d_1$	25	$0,003 \times d_1$	30	$0,003 \times d_1$				<input checked="" type="checkbox"/>
2.4	20	$0,002 \times d_1$	25	$0,002 \times d_1$	25	$0,003 \times d_1$	30	$0,003 \times d_1$				<input checked="" type="checkbox"/>	
2.5	20	$0,002 \times d_1$	20	$0,002 \times d_1$	25	$0,003 \times d_1$	30	$0,003 \times d_1$				<input checked="" type="checkbox"/>	
2.6	20	$0,002 \times d_1$	20	$0,002 \times d_1$	25	$0,003 \times d_1$	30	$0,003 \times d_1$				<input checked="" type="checkbox"/>	
<b>H</b>	1.1	70	$0,003 \times d_1$	80	$0,003 \times d_1$	90	$0,003 \times d_1$	100	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	1.2	60	$0,003 \times d_1$	70	$0,003 \times d_1$	80	$0,003 \times d_1$	90	$0,004 \times d_1$	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
	1.3												
	1.4												
	1.5												



	P	M	K	N	S	H
Werkzeugtyp Tool type	Hochleistungsfräser-Programm High performance end mill programme					
NR	Multi-Cut	Multi-Cut	Multi-Cut			
NF	Jet-Cut	TiNox-Cut	Jet-Cut		TiNox-Cut	
N	Jet-Cut	TiNox-Cut	Jet-Cut		TiNox-Cut	
W				Alu-Cut		
W				Fiber-Cut		
WR				Alu-Cut		
H						Hard-Cut
Werkzeugtyp Tool type	Hochleistungs-Universalfräser-Programm High performance universal end mill programme					
N	TOP-Cut	TOP-Cut	TOP-Cut	TOP-Cut	TOP-Cut	TOP-Cut

Druckerzeugnisse für Hochleistungswerkzeuge

Sales literature for high performance end mills



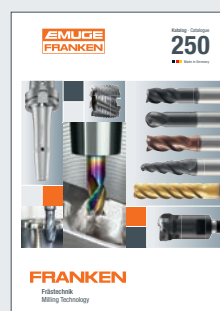
Druckerzeugnisse für Fräswerkzeuge mit besonderen Eigenschaften

Sales literature for milling tools with special characteristics



Hauptkatalog

Main catalogue



Durch die Verwendung von gekühlter Luft wird die Temperatur im Schneidenbereich herabgesetzt, wodurch höhere Schnittgeschwindigkeiten und Standzeiten erreicht werden können. Moderne Beschichtungen können durch diese Art der Kühlung erst alle Vorteile ausspielen, da eine Schädigung der Schneide durch Thermoschock vermieden wird.

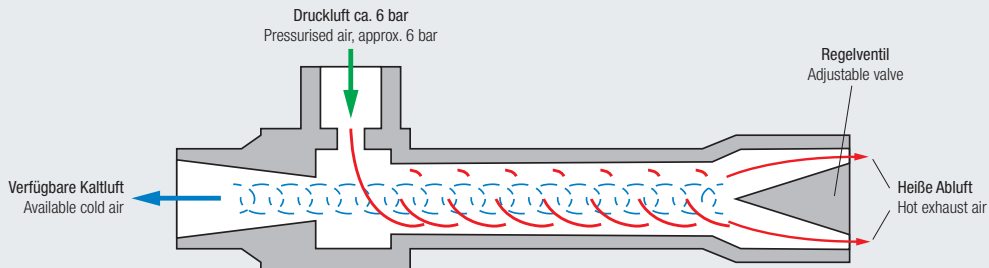
Darüber hinaus werden die beim Kopierfräsen anfallenden sehr leichten Späne auch aus tiefen Aussparungen oder Kavitäten mit Hilfe der Kaltluftdüse entfernt.

Die Wirkungsweise der Kaltluftdüse basiert auf dem Prinzip des Wirbelrohrs, in dem zwei gegenläufige, rotierende Luftströme (ohne bewegte Teile) erzeugt werden. An einem Ende tritt die innere Strömung als nutzbare Kaltluft mit bis zu -40 °C aus. Der Anschluss erfolgt über einen Druckluftanschluss.

Cooled air reduces temperatures in the cutting area, which in turn permits higher cutting speeds and longer tool life. This type of cooling enables modern coatings to achieve their full potential, as damage to the cutting edge resulting from thermal shock is avoided.

Moreover, the cold-air nozzle helps to remove the tiny chips produced in copy milling even from deep recesses or cavities.

The function of the cold-air nozzle is based on the principle of the vortex tube, in which two opposed, rotating air streams are generated (without any moving parts). The internal air stream exits from one end, in the form of useable cold air with a temperature as low as -40 °C. All that is required is a normal pressurised air connection.



**Temperatur gemessen am effektiven Austritt des Wirbelrohrs (nicht Düsenende)**  
Temperature, measured at the effective exit of the vortex tube (not the end of the nozzle)

Zuluft-Druck Supply air pressure [bar]	Temperatur der Nutzluft in °C bei einem Kaltluftanteil von Temperature of usable air in °C, with a cold air percentage of		
	25%	50%	75%
3	-31	-22	- 6
4	-35	-35	- 8
5	-39	-28	-10
6	-42	-31	-11
7	-46	-34	-13

**Luftverbrauch bei Eingangstemperatur von 21 °C**  
Air consumption, with supply air temperature of 21 °C

Eingangsdruck Input pressure [bar]	Luftverbrauch Air consumption	Kapazität Capacity
6,9	7,08 l/s $\cong$ 25,5 m <sup>3</sup> /h	226 kcal/h $\cong$ 263 W

**Anwendungsbeispiel:  
Standzeiterhöhung durch den Einsatz der Kaltluftdüse**

**Werkstück:** Formeinsatz gehärtet, Material K360 mit 63 HRC  
**Bearbeitung:** Schichten des Formeinsatzes  
**Werkzeug:** FRANKEN Hard-Cut  
Schneidendurchmesser 10 mm, 2 Schneiden

**Schnittwerte:**  $v_c = 240 \text{ m/min} \cdot n = 7639 \text{ min}^{-1}$   
 $f_z = 0,12 \text{ mm} \cdot v_f = 1833 \text{ mm/min}$   
 $a_p = 0,2 \text{ mm} \cdot a_e = 0,2 \text{ mm}$

Standzeit ohne Kühlung	Standzeit mit Kaltluftdüse
98 Minuten	<b>130 Minuten</b>

Durch den Einsatz der Kaltluftdüse konnte die Standzeit um 33% erhöht werden.

**Application example:  
Increased tool life using the cold-air nozzle**

**Workpiece:** Hardened mould, material K360 with 63 HRC  
**Operation:** Finishing the mould  
**Tool:** FRANKEN Hard-Cut  
Cutting diameter 10 mm, 2 flutes  
**Cutting conditions:**  $v_c = 240 \text{ m/min} \cdot n = 7639 \text{ rpm}$   
 $f_z = 0.12 \text{ mm} \cdot v_f = 1833 \text{ mm/min}$   
 $a_p = 0.2 \text{ mm} \cdot a_e = 0.2 \text{ mm}$

Tool life without coolant	Tool life with cold-air nozzle
98 minutes	<b>130 minutes</b>

By using the cold-air nozzle, it was possible to increase the tool life by 33%.



**Kaltluftdüse**  
Cold-Air Nozzle



**Lieferumfang:**

- Mit biegsamem Schlauch (Länge ca. 300 mm) für kalte Nutzluft
- Schalldämpfer (SN14) für heiße Abluft
- Kugelhahn mit Anschlussstück (ST 1/4) für Zuluftschlauch (NW6) mit Schnellwechselkupplung (NW7.2)

**Delivery includes:**

- With flexible hose (length approx. 300 mm) for cold air
- Silencer (SN14) for hot exhaust air
- Ball-valve with fitting (1/4") for inlet hose (6 mm) with quick-change attachment (7.2 mm)

Bestell-Code · Order code		6910
Länge (ohne Schlauch) Length (without hose)	Dimens.- Code	
225 mm	.15	●

**Ersatzschlauch**  
Spare Hose



Bestell-Code · Order code		6910
Länge Length	Dimens.- Code	
≈ 300 mm	.20	●
≈ 400 mm	.22	●
≈ 500 mm	.21	●

**Halterungen für die Kaltluftdüse**  
Holders for the Cold-Air Nozzle



Klemmarm mit Grundhalter  
Socket with basic holder



Klemmarm mit Magnethalter  
Socket with magnetic shoe



Klemmarm  
Socket



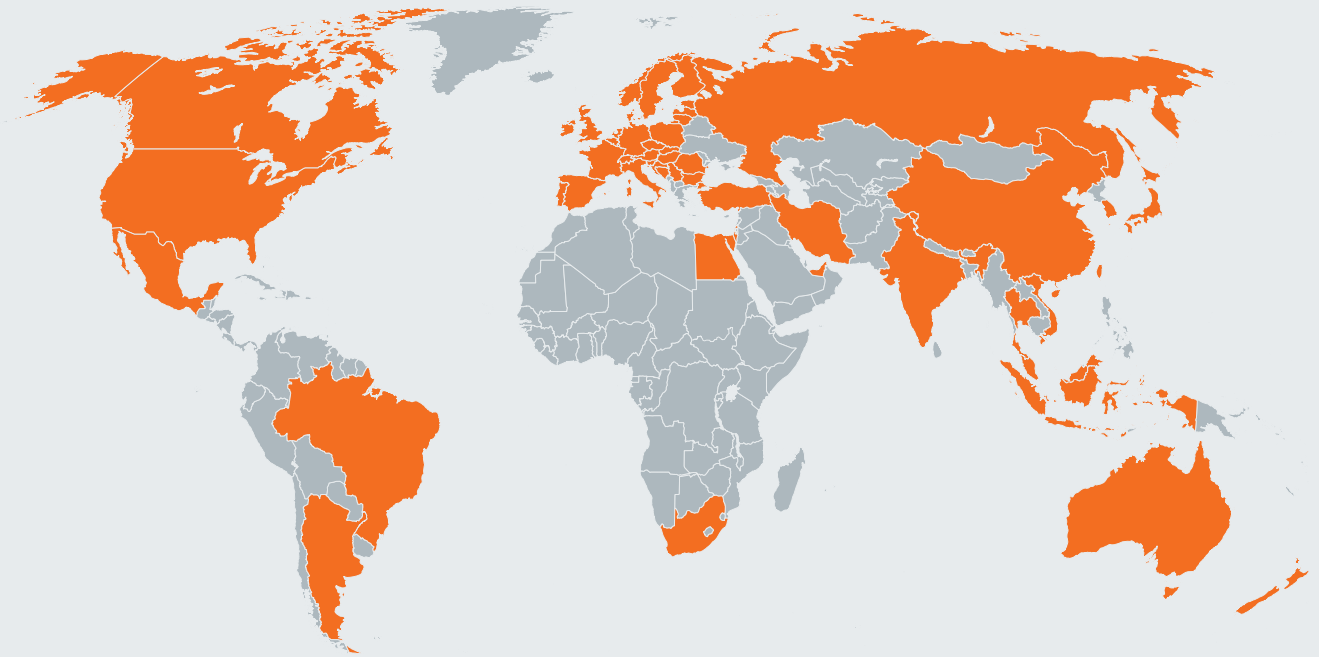
Grundhalter für Klemmarm  
Basic holder for socket



Magnethalter für Klemmarm  
Magnetic shoe for socket



Bestell-Code · Order code		6910			
Abmaße Dimensions	Dimens.- Code				
ø 45 x 68 mm	.24	●			
ø 80 x 80 mm	.25		●		
ø 80 x 17 mm	.26				●
ø 32 x 63 mm	.27			●	
ø 45 x 20 mm	.32				●



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EMUGE-FRANKEN sales partners, please see [www.emuge-franken.com/sales](http://www.emuge-franken.com/sales)

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